



# The Application of “AI+5G Network” in the Treatment and Control of Major Epidemics

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## Abstract

A comprehensive study of the support function of "AI+5G" information technology in the treatment, prevention and control during the pandemic period has been carried out, especially in the case of the shortage of medical resources nationwide and the sharp increase in the number of medical visits, which can effectively realize the integration of various resources, services and applications inside and outside the hospital, further expand the medical service space, and improve the efficiency of treatment, prevention and control. Through case analysis and induction, this paper analyzes the different roles and characteristics of AI technology, robot epidemic prevention service, telemedicine service and Internet medical technology in the treatment and control of major epidemics. The results show that "AI technology+5G network" information technology plays an important role in early detection, monitoring and early warning, pathological sharing, diagnosis assistance and diagnosis and treatment improvement, effectively reducing cross-infection and treatment pressure, Meet the needs of medical treatment and improve the efficiency of treatment.

## Keywords

Information technology, robot, artificial intelligence

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Under the network environment, the deep integration and reorganization of medical and information technology is an inevitable trend. Under the background of the increasingly perfect 5G technology, the mobility of AI technology+5G technology in government supervision, clinical diagnosis and treatment, patient service and other aspects was used to explore the specific implementation of 15 national health organizations in the outbreak of the epidemic in China since the outbreak of the epidemic, and the effective and feasible technology application prediction in the development stage of the epidemic (early, middle and late) was explored by using the case method [1].

## 1. Analysis of prevention and control system of sudden infectious diseases

### 1.1 Artificial intelligence technology

Professor Zhong Nanshan's research team plays an important role in epidemic early warning, early warning, early warning, early warning and other aspects. According to the artificial intelligence technology and the dynamic SEIR optimization model of epidemic, Professor Zhong Nanshan's research team predicted the development of major epidemic diseases in China through the artificial intelligence technology and the dynamic SEIR method of epidemic, and reached the conclusion that if Hubei took corresponding measures within five days, Then the infection rate of the virus will drop to one third of the original. Wuhan Fangcang Fangcang Hospital has launched the AI "voice input treasure house", which will classify the patient's diagnosis and treatment information after the speech recognition as text. "The tracking robot can classify the patient's diagnosis information and medical history information, and

combine it with the special medical voice recognition system, which can achieve 98% accuracy and input 4000 words per minute", greatly reducing the manual operation time of medical workers [2].

The artificial consultation does not need the subjective answer of the doctor. It can be completely replaced by artificial intelligence. The patients in Ruijin Hospital of Shanghai Medical College can check the temperature, cough and other aspects of the patients manually. In order to better control the number of patients and the condition of patients, we decided to change the manual telephone tracking into intelligent voice call, so that patients can talk with patients according to the scheduled call schedule, and convert the answers of patients into written records, thus reducing the tracking of patients by medical institutions. A "pneumonia knowledge base" with more than 6000 knowledge points has been built to assist online consultation, extract the questions raised by patients and store them in the knowledge base to provide artificial intelligence consultation for various groups.

## 1.2 Telemedical services

Through telemedicine, the medical burden of medical institutions is reduced, the level of emergency response is enhanced, and the exchange and exchange of medical resources is realized. In order to realize image sharing and remote diagnosis of the influenza pandemic in 2020, the Seventh Hospital of Wuhan City of Leishen Mountain connected the "remote image consultation" system in the central and southern region of Wuhan to the radiologists of Wuhan Central and Southern Hospital through cloud technology, and uploaded it to the 17 medical image collection workstations of the Internet terminals of Beijing Friendship People's Hospital, and combined with the mobile image query system. In case of an outbreak of the epidemic, Radiologists can read and express opinions remotely at home; Meanwhile, Tongji East District uses Lifesize soft terminal call system, Huawei cloud video and other software equipment to conduct remote consultation and command of the command center, communication command vehicle and "cloud consulting room" in the square cabin of Wuhan, and can instantly share the patient's medical records and physical examination data, greatly improving the efficiency of medical treatment and treatment [3].

The First Affiliated Hospital of Xinjiang Medical College, based on telemedicine services, realizes 24-hour remote consultation, remote training, remote conference, remote consultation and case remote discussion. The First Affiliated Hospital of Qingdao University uses the remote consultation platform to realize voice and image doctor-patient communication and medical record reporting between consultation experts, isolation ward doctors and isolation patients, and reduces the risk of nosocomial cross-infection; Guizhou Jiangjunshan Hospital has introduced a visual monitoring system. Hospital sense experts can command and control the wearing and taking off of protective clothing of medical staff in real time through the intercom system [4].

## 1.3 Epidemic prevention service of robots

In the process of epidemic prevention and control, Shanghai uses robots to carry out epidemic detection, prevention and control, disinfection, allocation and other prevention and control work, introduces temperature measuring robots, guidance robots, nursing robots, material handling robots, cleaning and disinfection robots, and uses infrared temperature measuring equipment to detect the human body. Once any abnormality is found, it will be reported to the system as soon as possible. The role of medical guidance robot is to popularize disease knowledge, conduct various guidance and explanations, and at the same time, provide fever consultation for patients, and provide inpatient guidance for patients. The system can realize long-distance medical support, and can independently or assist medical workers in ward rounds in isolation wards and clinics. The People's Hospital of Shandong Province has introduced intelligent logistics services to realize the distribution of designated materials in departments with high risk of infection, and realized the automation of transportation by using RFID tags [5].

## 2. Analysis

### 2.1 Application analysis

(1) The application of intelligent technology in clinical practice, including early detection, symptom monitoring, voice recognition of medical records, and intelligent medication guidance, has significantly improved the work efficiency of medical personnel. In particular, during the 48-14th follow-up period, AI technology can be used to track patients like manual work, record the patient's medical records in detail, and automatically prompt and upload the patient's physical condition, so as to achieve comprehensive intelligent monitoring and early warning of the epidemic and thus achieve comprehensive control of the epidemic.

(2) The prevention and treatment of infectious diseases will be the focus in the future in various aspects such as temperature measurement, guidance, nursing, cleaning and disinfection, and transportation of materials.

## 2.2 From the perspective of service subjects

Through network technology and network technology, the cross-infection occurred during the online medical treatment of patients was reduced. At the same time, the cross-infection in the network was reduced through network technology. Through the comprehensive evaluation of the patient's condition, a set of reasonable plans was formulated for the doctors in the hospital.

## 2.3 Development stage perspective

From the perspective of the development process of the epidemic, AI+5G technology in the early development of the epidemic is supplemented by reducing cross-infection, establishing systems, stable operation, monitoring, and accurately studying and judging the development trend of the epidemic; In the medium-term stage, it is mainly to improve the treatment effect of medical workers, improve the satisfaction of patients with patients, and ensure the focus of medical treatment and research with the reasonable distribution of human and material resources; In the later stage of the epidemic, the focus is to collect various kinds of data, establish a set of epidemic early warning and early warning system based on AI+BI based on data quality control and data analysis, improve the precise epidemic prevention level of the hospital, and provide real-time and comprehensive data support for epidemic monitoring and supervision [6].

## 3 Epidemic warning and management

The COVID-19 has the characteristics of single point outbreak and rapid transmission, which makes it extremely difficult to prevent and control the epidemic, identify high-risk groups and early warning. The hospital is an important working department at present, which is in urgent need of effective risk early warning and management.

### 3.1 Accurate identification and early warning of high-risk groups

At the beginning of the epidemic, the focus of the hospital's work was to prevent the spread of infectious diseases, as long as the patients who had recently gone to the epidemic area could be accurately identified, and the medical staff should be warned, so as to carry out early prevention and protection of the epidemic in the hospital. According to the current situation of the hospital, before the closure of the epidemic area, the travel information of the people from the epidemic area to the epidemic area is collected, summarized and summarized through civil aviation, railway and other channels to form a database of high-risk people, update HIS, and connect data with high-risk groups. For patients appearing in the database of high-risk groups, the specific situation of the patients from the epidemic area to the local area will be displayed on the screen, and the medical staff of the hospital will be notified for treatment.

### 3.2 Upgrade of infectious disease report management system

Because in the early stage of the epidemic, China has not released the ICD code, so we have upgraded the report management of the virus and entered new case data using the code in ICD-10. After the country released the ICD code of ICD and novel coronavirus infection, the hospital medical record was updated and updated to the filling form and report form of COVID-19 report [7]. When the case is confirmed, the hospital will ask the doctor to fill in the corresponding infectious disease report form to ensure that the patient's condition is reported to the hospital at the first time, and take technical measures to prevent the missing and false report of infectious patients.

### 3.3 Pre-inspection and triage on the code

During the epidemic, all patients coming to the hospital for medical treatment must first register with their real names, and then the hospital staff will review the patient's data. Using traditional paper forms to fill in is not only inefficient, but also easy to cause personnel density, increasing the risk of cross infection. The pre-test triage platform has been promoted in the organization and online. Patients can log in to the pre-test triage on Alipay or WeChat public account to complete the pre-test triage, or use the QR code of the pre-test triage system to directly log in to the pre-test triage system to fill in the form, which greatly improves the working speed of the pre-test triage and reduces the gathering of patients and their families.

## 4. Patient service during the epidemic

When the COVID-19 occurred, the hospital was a high-risk area for infection, and ordinary citizens should try not to go there. For people who take medicine for a long time and have actual medical needs, the implementation of network telemedicine service can effectively reduce the burden of epidemic management.

### 4.1 Internet hospitals provide special services for COVID-19

In order to prevent patients from gathering in the hospital for cross-infection, we have set up a "anti-coronal zone" online, where dozens of experts provide free epidemic consultation for patients online. The initial screening is carried out by information exchange between doctors and patients. We will closely track suspected outpatients and provide psychological counseling for outpatients to reduce the panic of the population. In order to facilitate the automatic screening of COVID-19, we have developed a set of intelligent screening software for novel coronavirus, which can provide its diagnosis and diagnostic information to patients.

### 4.2 Internet expert outpatient service and drug distribution

In order to reduce the concentration of inpatients, the flow of people in the routine offline outpatient service is restricted. At the same time, patients also have great security risks. According to the needs of patients and chronic disease patients who take medicine for a long time, we will concentrate our efforts to establish an expert consultation platform, and establish an expert consultation platform online. We have established the services of online consultation by medical experts, offline examination by pharmacists, and delivery to home by professional logistics companies. These measures include: medical treatment for ordinary patients, medication for patients with chronic diseases, medical expenses for inpatients with serious diseases in designated hospitals, etc [8].

## 5. System implementation

### 5.1 Hospital information system

By setting up a doctor workstation, a nurse workstation, and a laboratory workstation, the medical workstation can query the examination and test results in real time, so as to ensure the clinical service, medical management and operation management needs of medical institutions, and basically realize the integrated hospital information system. According to different medical service objectives, corresponding systems and functions are proposed, and various data between hospitals are fully connected by using the integrated medical information platform.

The hospital information system has been fully networked, and actively promoted the networking of medical information systems in various regions, as well as the interconnection and data sharing with information systems such as the provincial medical supervision platform, the new rural cooperative medical information system, the provincial medical security system, and the telemedicine platform.

On this basis, a big data real-time monitoring system for the COVID-19 was established to monitor the hospitalization, discharge, geographical distribution of patients and treatment process in real time, providing data support for medical institutions to make decisions

### 5.2 Visualization system

It is constructed in strict accordance with the framework of "one network, one platform and one hub" to realize the integration of telemedicine integrated services in the province, and install remote consultation terminals in the doctor workstations of each department to provide real-time technical support for hospital medical staff [9]. The hospital's telemedicine technology has supported the out-of-town expert clinics and the visits of patients' families, reducing the risk of out-of-town infection.

In view of the long-term closed status of COVID-19 patients, a set of visual doctor-patient communication system was established, which realized the visual communication inside and outside the ward, realized the "face-to-face" interaction between medical experts and psychological consulting experts and patients, and strengthened the humanized service.

In order to strengthen the hospital sense control, command and control the protective clothing of medical staff in real time, and ensure the safety of patients and medical staff, the hospital launched the hospital sense visual prevention and control monitoring system. Through the visual intercom system, the hospital sense experts timely correct the incorrect operation when wearing and taking off protective clothing, conduct real-time supervision and guidance on

high-risk links of medical staff, and ensure that the medical staff have zero infection in the treatment of epidemic situation.

### 5.3 Basic network construction

Integrated wiring is an important part of smart grid, and its operation performance and smoothness will be affected. A safe and stable network system that conforms to the national standard cannot guarantee the long-term safe and stable operation of the entire network system. The network system is an important part of the hospital information system. In the process of infrastructure construction, when the site environment is very messy, we must strictly implement the dual protection policy of "physical isolation of internal network and external network, and physical isolation of business computer and network computer", establish and improve the internal network of the hospital, and use fire wall and other security facilities to protect our business system [10].

## 6. Summary

The application of "AI+5G" technology in the prevention and control of major infectious diseases also faces some difficulties. First of all, online medicine/online consultation and remote consultation can bring convenient and fast diagnosis and treatment to patients and doctors, and at the same time, we should pay attention to the personal information of patients, and try to protect the personal information of patients to the greatest extent possible. Strengthen self-inspection and monitoring of problems in the hospital's internal network system, strengthen its standardized management, and reduce the risk of information leakage; Secondly, drug distribution on the Internet is mainly aimed at patients with chronic diseases such as hypertension and diabetes, as well as patients with malignant tumors and coronary intervention surgery. If patients are infectious diseases, emergencies, and critical patients, it is better to seek medical advice in a timely manner rather than using the Internet. Third, if we want to truly realize it, we must use different kinds of data for basic analysis, ensure the safety of various data, and prevent excessive data collection. Therefore, we must supervise the safety of relevant data, conduct risk assessment, establish a safe safety management system, and ensure the safety of medical information.

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