

# Research on Emergency Management System of Emergent Infectious Diseases in China

## --Take the prevention and control of SARS and COVID-19 as examples

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### Abstract

**This article takes SARS and the new type of coronavirus pneumonia (COVID-19) as the starting point, reviews the SARS epidemic and response measures, summarizes the new type of coronavirus pneumonia, anti-epidemic measures and preliminary results, and systematically elaborates The emergency management system of infectious diseases in our country has been in the process from the initial establishment to the gradual improvement.**

### Keywords

**SARS; COVID-19; Sudden infectious disease; Emergency management system.**

## 1. Introduction

The ravages of SARS exposed our country's insufficient ability to face sudden infectious disease incidents. Let us face the shortcomings of the emergency management system, which prompted us to make every effort to promote the construction of emergency management system for emergency infectious disease incidents. Compared with the phenomenon of "Lagged Diagnosis", "Local Government Blocking News", "Popular Panic", and "Second Crisis" in the 2003 SARS incident, in the process of handling the COVID-19 epidemic, my country has formed a central government The leading group for epidemic work uniformly deploys leadership, the State Council's joint prevention and control mechanism and its subordinate member units uniformly dispatch the prevention and control mode of the organization [7]. The Party Central Committee has made significant progress in judging the epidemic situation, deploying various tasks, and taking measures.

## 2. The formation of an emergency management system for sudden infectious diseases in my country

### 2.1. SARS incident-the initial establishment of the management system

#### 2.1.1. Basic situation of SARS incident

A retrospective epidemiological investigation found that the first severe acute respiratory syndrome appeared in Foshan, Guangdong on November 16, 2002. It took 2 months from the onset of the first case in my country to the diagnosis. The number of confirmed cases in Guangdong Province continued to increase in mid-February 2003, but the pathogen was still unclear at this time. On March 6, Beijing received the first imported SARS case. The WHO officially called the disease SARS on March 15. After SARS broke out in my country and experienced an initial period of more than one month, it quickly spread to 29 countries and regions around the world, raging on the earth for nearly 300 days<sup>[1-2]</sup>. On April 16, the World Health Organization announced in Geneva that it had confirmed that the pathogen causing

atypical pneumonia was a mutated coronavirus. After about half a year, the epidemic was under control. As of the end of June 2003, 5327 people had been ill and 349 had died in Mainland China, of which 1002 were infected by medical staff; 1755 people had been ill and 298 had died in Hong Kong, China, and Taiwan, China 671 people were ill in the region and 84 people died, and 1 person was ill in Macau, China, with no deaths. As of August 5, 2003, 29 countries had reported 8422 clinically confirmed cases and 916 deaths. The average fatality rate of the reported cases was 9.3%<sup>[3]</sup>.

### **2.1.2. The SARS epidemic response process**

In December 2002, the two SARS patients who were first admitted were treated as general pneumonia, and the countermeasures remained on the routine treatment of the disease. The five medical staff who contacted the patients were also infected without exception. Not quarantining the confirmed cases and observing and quarantining close contacts, leading to missed the best time to cut off the source of infection.

In January 2003, dozens of medical staff were infected in the Second Affiliated Hospital and Third Affiliated Hospital of Sun Yat-Sen Medical University, which received patients with the same symptoms. The Guangdong Provincial Department of Health immediately discovered the seriousness of the problem and quickly organized an organization by Zhong Nanshan. The expert group led by academicians conducted isolation treatment on SARS-infected patients and conducted related research, and SARS was gradually controlled <sup>[1]</sup>. However, the virus spread rapidly. In March 2003, the Beijing People's Liberation Army General Hospital received an imported pneumonia patient. Also because it was not paid attention to, SARS spread in Beijing and many medical staff were infected <sup>[4]</sup>. SARS quickly spread to other provinces and cities and spread all over the world. On April 30th, Beijing opened Xiaotangshan Hospital as a special hospital for SARS prevention and treatment to receive and treat SARS patients. Under the leadership of Academician Zhong Nanshan, my country has pioneered hormone-combined non-invasive ventilation technology to alleviate the condition of patients, increase the cure rate, reduce the mortality rate, and make an important contribution to the fight against the epidemic <sup>[4-5]</sup>. By July 2003, the SARS epidemic was basically over. After the SARS outbreak, the local government of Guangdong Province first blocked the news of the epidemic, and devoted its main energy to the knowledge of the disease and the study of the virus, and took measures to "continuously comfort" the masses to deal with the infectiousness of the disease and the number of deaths. However, information such as preventive measures and other information was not immediately notified to the masses, depriving them of their right to know the truth of the incident, and narrowly believed that the dissemination of crisis information would cause social panic and confusion, undermining the image of the government, and discarding the "people-oriented" thinking. In the back of the head, other provinces and cities were unable to grasp the situation in time and take timely prevention and control emergency measures, and missed the best period to effectively stop the spread of the disease. In addition, due to the lack of a correct understanding of the SARS epidemic by the public, and the spread of rumors, various panic psychology has emerged, which eventually led to a "second crisis"<sup>[2]</sup>.

### **2.1.3. My country's emergency management system for infectious diseases has initially taken shape**

After the victory in the fight against SARS, the construction of the emergency management system for emergencies in China has begun to be on the right track. my country has adopted the "one case, three systems" system and adopted the "Emergency Response Law", "Infectious Disease Prevention and Control Law", and "Occupational Disease Prevention and Control Law"., "Food Safety Law" and other laws and regulations, draw on foreign emergency handling experience, learn from the past experience and lessons of similar emergency handling, and carry out the preparation of an emergency management plan system for infectious diseases in

a planned and systematic manner. Five years of construction has initially formed a national emergency command and decision-making system for public health emergencies, and established and improved a health emergency plan system<sup>[1]</sup>. All provinces, cities and counties have responded to the state to set up corresponding supporting institutions to establish a solid foundation for scientific, orderly and effective response to sudden infectious diseases.

## 2.2. The COVID-19 incident—the management system is gradually improved

### 2.2.1. The basic situation of the COVID-19 epidemic

On December 1, 2019, the first case of unexplained viral pneumonia occurred in Wuhan City, Hubei Province, my country. Subsequently, a number of cluster infection cases broke out with the South China Seafood Market in Wuhan City as the center. From January 19 to January 22, 24 provinces, municipalities directly under the Central Government including Guangdong, Beijing, Shanghai, Tianjin, Zhejiang and Hong Kong and Macau Special Administrative Regions were all diagnosed with the first case of imported novel coronavirus pneumonia. With the full-scale outbreak of COVID-19 across the country, as of January 28, the cumulative number of confirmed cases in my country's 31 provinces, municipalities, and autonomous regions exceeded the number of SARS confirmed in 2003. Since then, the number of new coronavirus pneumonia cases has continued to surge. As of July 24, 2020, a total of 86,635 confirmed cases and a total of 4675 deaths have been reported. Soon after the emergence of new coronavirus pneumonia cases in my country, confirmed cases have also appeared in Japan, South Korea, the United States, Singapore and other countries. The foreign epidemic situation has gradually raged on a large scale. As of July 24, 2020, there are already 188 countries in the world. A new type of coronavirus pneumonia has been found in the region, among which 76 countries have confirmed cases in excess of 10,000. A total of 15,624,664 confirmed cases abroad, and 632,931 deaths.

### 2.2.2. Comparative analysis of my country's response to SARS and COVID-19

#### 2.2.2.1. Comparison of SARS and COVID-19 situation

From the discovery of the first SARS case in Foshan, Guangdong on November 16, 2002 to the announcement of zero SARS cases in the country by the Ministry of Health on August 16, 2003, my country's struggle with SARS lasted for 272 days<sup>[2]</sup>. The department's inattention to SARS and atypical pneumonia is one of the important reasons why the virus has been raging throughout the country for a long time. Some information about SARS and COVID-19 are shown in Table 1.

Table 1 Comparison of SARS and COVID-19 epidemic situation in my country

	SARS	COVID-19
The cumulative number of confirmed cases is	8096	86635 (as of July 24)
Cumulative deaths	774	4657 (as of July 24)
Mortality	9.56	—
Number of infections among medical staff	1005	3387 (as of February 24)
Is the first case misdiagnosed	Yes	No

#### 2.2.2.2. The command and leading role played by the Party Central Committee and government departments at all levels

On December 29, 2019, Hubei Provincial Hospital of Integrated Traditional Chinese and Western Medicine reported to the Provincial and Municipal Health Commission's Disease

Control Department the signs of the epidemic found in 4 patients with unexplained viral pneumonia, and the subordinate local CDCs immediately launched it. Epidemiological Investigation. Two days later, the National Health Commission sent experts to Wuhan to investigate. On January 7, 2020, the laboratory of the Chinese Center for Disease Control and Prevention detected the virus as a new type of coronavirus and obtained the entire genome sequence of the virus. In response to the sudden new crown pneumonia epidemic, the National Health Commission took the lead in establishing the State Council's joint prevention and control mechanism. The mechanism is composed of 32 departments, clarifying their respective tasks, division of labor and cooperation, and generating a strong joint force for prevention and control of the epidemic. On January 20, 2020, Sun Chunlan, Vice Premier of the State Council, presided over the first meeting of the State Council's Joint Prevention and Control Mechanism. With the substantial increase in the number of reported cases, Wuhan immediately established a headquarters for the prevention and control of pneumonia caused by the new coronavirus. Various national departments have also taken different measures to join the battle against the epidemic. See Table 2.

Table 2 Situation of prevention and control measures of some countries and local departments during the epidemic.

Names of national and local authorities	Part of the measures or notices
The State Council	Set up an "Internet + Supervision" platform to collect clues about the under-reporting and concealment of the epidemic from the society, and the verification will be dealt with seriously; a number of notices to protect and care for medical personnel will be issued and implemented; and the "Lack of Guardianship Due to the Impact of the New Crown Pneumonia Children's Rescue and Protection Work Plan; "Guiding Opinions on Doing a Good Job in the Normalization of the Prevention and Control of the New Coronary Pneumonia Epidemic" was issued.
National Civil Aviation Administration and China Railway Group Co., Ltd.	Starting from January 28, 2020, passengers who previously purchased national railway train tickets and air tickets voluntarily change their itinerary and require refunds, no refund fee will be charged.
The cultural and tourism bureaus of many provinces and cities	Cancelled large-scale Spring Festival events; closed scenic spots, museums and other public places.
The Propaganda Department of the Central Committee of the Communist Party of China and the State Administration of Radio,	Film and Television will present the copyrights of 10 domestic TV dramas including "Emergency Doctor" to Hubei TV and Wuhan TV; deploy various satellite channels across the country to strengthen epidemic prevention and control propaganda and public opinion guidance, reduce entertainment activities, and increase epidemic prevention and control Report; The 2020 Spring Festival Gala show "Love is a bridge", aimed at encouraging all the staff who are fighting on the front line; withdrawing seven Spring Festival movies.
The Ministry of Transport of the	Exemption of tolls for the transportation of emergency supplies and personnel for epidemic prevention and control and guarantees priority travel.

People's Republic of China	
The National Health Commission	A total of seven editions of the "Pneumonia Prevention and Control Plan for Novel Coronavirus Infection" have been released.
The Ministry of Education of the People's Republic of China	Extend the Spring Festival holiday in time; postpone the school start time and travel on a staggered peak.
National Medical Security Administration	For pneumonia patients diagnosed with a new type of coronavirus infection, the personal burden will be subsidized by the government, and comprehensive protection will be implemented.
State Grid	To protect people's livelihood electricity, during the epidemic period, residents will adopt non-stop measures for electricity arrears.

As of January 25, 30 provinces across the country have announced the initiation of a first-level response to major public health emergencies. On the same day, Xi Jinping, General Secretary of the CPC Central Committee, convened the Standing Committee of the Political Bureau of the Central Committee to study the prevention and control of the epidemic. At the meeting, the Party Central Committee decided to be led by the Standing Committee of the Political Bureau of the Central Committee to establish a central leadership group for epidemic work, and strengthen front-line prevention and control work by assigning steering groups to severe areas. In terms of epidemic prevention, control and treatment, from January 23 to February 23, Our country arranges preventive strategies in response to local conditions and the situation of epidemic prevention and control, with Wuhan and Hubei as the main battlefields, and individual guidance for other provinces. At the same time, all provinces and cities across the country quickly dispatched more than 330 medical teams and more than 41,600 medical staff to assist Hubei and Wuhan, and organized 19 provinces to support Hubei's subordinate cities. In addition, centralized hospitals and shelter hospitals such as Huoshenshan and Leishenshan have been opened. In terms of ensuring the supply of medical supplies and daily necessities, we will help manufacturers of medical supplies such as protective clothing and masks to resume work and production as soon as possible, and use various methods to increase production, while ensuring that the nation's daily necessities market is generally stable. In terms of pathogen detection and epidemic prevention of sudden infectious diseases, we will make every effort to promote medical research and development and clinical application, and develop rapid virus detection kits to provide valuable time for clinical diagnosis. In terms of maintaining social stability and psychological guidance of the masses, strengthen publicity, education and public opinion guidance, timely report on the effectiveness of joint prevention and control measures in various regions, and standardize and improve the information release mechanism. Coordinate online and offline, domestic and international, capture the warm and moving deeds of the epidemic, and create a correct, rational, and positive environment. In terms of international exchanges, it cooperates with the WHO and the international community and maintains information exchanges, shares the entire genome sequence of some strains of pathogens, and strives to prevent the spread of the epidemic in the world, and at the same time actively seeks support from the international community [6].

Through nearly two months of hard work, my country's epidemic prevention and control has achieved initial results. As of 24:00 on February 28, the cumulative number of cured cases nationwide exceeded the number of confirmed cases for the first time. As of March 1, my

country's 29 provinces, municipalities, autonomous regions, and Macao Special Administrative Region have achieved zero growth in new coronavirus pneumonia. According to incomplete statistics, as of February 12, state-owned enterprises across the country have resumed work and production on a large scale. Among them, the resumption rate of state-owned enterprises in Beijing reached 99.7%, the resumption rate of state-owned enterprises in Shanghai was about 80%, and the resumption rate of state-owned enterprises in Zhejiang was about 79%. The resumption rate of enterprises in Fujian Province reached 77.9%, and that of enterprises in Gansu Province was about 85%<sup>[8]</sup>.

### **3. Achievements in the construction of my country's emergency management system for infectious diseases**

Emergent infectious disease is a kind of public emergency, and its construction history is integrated into the construction of our country's emergency management system. From reform and opening to the fight against SARS, my country has always adopted an emergency management model of "decentralized coordination and temporary response". The emergency management mechanism at this stage is mainly characterized by single-hazard classification management, which has the characteristics of professionalism, unity, and fragmentation<sup>[9]</sup>. In the face of "comprehensive emergencies", a temporary coordination agency is usually established to carry out emergency management. However, this approach has problems such as the dispersion of government emergency response forces and the separate management of departments, which leads to low emergency response efficiency. In 2003 caused by SARS, this emergency management mode fully exposed its shortcomings in the all-round public health emergency that affected the society, economy, and life of the masses, and it also made the emergency management work affected by the government and various parties. With the great attention of high-level departments, my country's comprehensive strengthening of emergency management has begun.

#### **3.1. Establishing "one case, three systems", a comprehensive emergency management model**

After the victory against SARS, the trend of entering a risky society at home and abroad requires us to improve the comprehensiveness and linkage of our emergency management system as soon as possible. Therefore, the Party Central Committee and the State Council clearly stated at the commendation meeting that governments at all levels should attach great importance to extraordinary prevention and control and implement the "one case, three systems" approach. The construction is based on my country's "Emergency Response Law", "Infectious Disease Prevention Law", "Public Health Emergency Response Regulations" and other relevant laws and regulations, and will prepare national overall plans, department special plans, and emergency plans for various provinces and cities. As a key task to advance, including "Emergency Plan for Infectious Diseases". In July 2005, the State Council held the first national emergency management work conference, and issued the "National Emergency Plan for Public Emergencies", which put China's emergency management into an institutionalized and legalized work track, making my country's emergency public health emergencies. The construction of the emergency response plan system framework for the incident has basically succeeded. In general, the "one case, three systems" is the cornerstone of the development of my country's emergency management system for infectious diseases, which has made qualitative progress in my country's emergency response, prevention, control and treatment during major epidemics.

In March 2006, the construction of the emergency management system was incorporated into the overall layout of the "four in one" by the state, clarifying the positioning, objectives, tasks and policies of the system management. In April of the same year, the General Office of the State

Council established the Emergency Management Office of the State Council (General Duty Office of the State Council) to play the role of guarding emergency incidents, summarizing information, coordinating functions, and operating hubs. At the same time, the relevant departments of the State Council and the people's governments at or above the county level have successively established emergency management leading institutions and offices <sup>[10]</sup> to lay the organizational foundation for local emergency response work. This is an important turning point for my country's emergency management system to be systematic and standardized, and it is also an important sign of the formation of a comprehensive emergency response system. In addition, the "emergency management work pattern with the participation of the whole society" has gradually taken shape, including strengthening the construction of the military's emergency response system and its support to local governments, giving full play to the important role of experts in emergency management, carrying out emergency management training and facing the whole world. Social science missionary work<sup>[11]</sup>. So far, our country has formed a pattern of "emergency management system with unified national leadership, comprehensive coordination between the upper and lower levels, classified management of departments, and hierarchical responsibility of subordinates".

This comprehensive collaborative emergency response system has responded to public health emergencies such as H5N1 Avian Influenza, human infection with *Streptococcus suis*, H1N1 Avian Influenza, and H7N9 Avian Influenza. In light of its own national conditions, our country has actively responded to the present and learned from the past, and scientifically prevented and controlled it, minimizing losses in several outbreaks of infectious diseases, and winning the initiative. Under the guidance of General Secretary Xi Jinping's "adherence to the overall national security concept", in April 2018, my country integrated the emergency management related functions of the various departments under the State Council and formally established an emergency management department to create a unified command, expertise and response. An emergency management system with Chinese characteristics that is sensitive, top-down linkage, and combination of peacetime and wartime.

### **3.2. Improving the disease prevention and control system and advancing the construction of infectious disease prevention and control**

After experiencing "SARS", national, provincial, municipal, and county (district) finances began to focus on the construction of disease prevention and control centers at all levels, and spent a lot of money to establish a monitoring information system for infectious diseases and public health emergencies in China. Local health agencies can directly report the number of infected people. Disease control centers at all levels understand the epidemic situation in their jurisdictions as soon as possible, and write infectious disease analysis reports daily to form a standardized epidemic analysis to provide a data basis for relevant departments to deal with infectious diseases. In 2017, the white paper "Development of China's Health Care and Progress in Human Rights" pointed out that my country has established the world's largest, horizontal-to-edge, and vertical-to-bottom direct online reporting system for infectious disease epidemics and public health emergencies, achieving 39 legal infections. Real-time and online monitoring of case information and public health emergencies<sup>[12]</sup>.

In terms of scientific and technological construction for the prevention and control of infectious diseases, my country has established an internationally advanced technology system for pathogen screening and identification, a core technology system for pathogen molecular typing and monitoring, and the world's largest laboratory network. At present, our country's ability to prevent infectious diseases has reached the international advanced level, and the ability to identify and detect pathogens of sudden infectious diseases has been improved by leaps and bounds.

In order to strengthen and standardize the construction and management of the national health emergency team, and comprehensively improve the emergency response capability and level of the national health emergency team, in November 2010, the General Office of the Ministry of Health issued the notice of "National Health Emergency Team Management Measures (Trial)". All provinces, autonomous regions, and municipalities directly under the Central Government, the Health Bureau, the Xinjiang Production and Construction Corps Health Bureau, the Chinese Center for Disease Control and Prevention, the Health Supervision Center of the Ministry of Health, and the subordinate (management) hospitals are required to build public health prevention and control teams in accordance with the requirements. From 2011 to 2012, the construction of a number of national infectious disease prevention and control teams invested by the central government was completed. These teams have established long-term training and exercise mechanisms, and have strong rapid response capabilities in the face of sudden infectious diseases. Mobile deployment capabilities and self-protection capabilities can play an important role in responding to sudden infectious disease outbreaks and ensure that there is no major epidemic after a major disaster<sup>[1]</sup>. In order to further improve the administrative decision-making mechanism, in March 2011, the Ministry of Health decided to establish an emergency health emergency expert advisory committee. In the face of infectious disease epidemics, the expert advisory group played an important role in the formulation of every decision, deployment, and prevention and control plan. The guiding role has also enabled our country's response to sudden infectious diseases to complete the change from "passive response" to "active confrontation".

#### **4. The shortcomings of my country's emergency management system for infectious diseases**

Although in the past ten years, my country's public health emergency management system has achieved many milestones, many shortcomings have been exposed in the process of responding to the new crown pneumonia epidemic, and there are still obvious problems within the system itself. The shortcomings.

##### **4.1. The system for the prevention, control and treatment of sudden infectious diseases is not sound**

Whether it's SARS or the new crown pneumonia epidemic, some provinces, cities, and localities have the following problems: The speed of emergency response to major public health emergencies is lagging; emergency response is more important than prevention; medical institutions for infectious diseases at all levels are insufficient in material reserves; medical institutions It cannot be closely integrated and effectively connected with the work of disease prevention and control institutions. Especially in the early stages of the epidemic, the above-mentioned problems became more serious. In the prevention and control of the new crown pneumonia, some local and departmental leaders have weak awareness of problems, insufficient decision-making capabilities, and inadequate implementation of responsibilities in their work. There are insufficient prevention and control, prevarication, delayed reporting, underreporting, underreporting, etc. The problem has caused many unnecessary losses to the masses. It is worth mentioning that, compared with the leading cadres of various local governments, the CDC is responsible for collecting infection information in the early stage of the epidemic, and is more professional in judging the trend of the epidemic and analyzing and researching pathogens. In China, the special status of the Centers for Disease Control has not received enough attention.

#### 4.2. It presents the characteristics of "high-risk cities and undefended rural areas" [11].

Many local grassroots and community health centers have backward prevention and control capabilities and loose prevention and control organizations. In addition, residents have low levels of education, poor hygiene habits, and low awareness of self-prevention and control in the face of the epidemic, and they are often areas with high incidence of infection. Therefore, there is still a long way to go to truly implement the emergency response plan at every grassroots level. At the same time, society and schools are weak in emergency education and crisis education for the masses and students. In the face of sudden infectious diseases, the people have serious psychological panic or are at a loss for risks. Accompanied by public opinion and rumors, they begin to go crazy. Panic buying of medicines and blindly buying home remedies have led to disorder in social order.

#### 4.3. The hospital treatment system is chaotic

As far as the hospital treatment system for sudden infectious diseases is concerned, in this epidemic, many hospitals in high-risk areas have rushed and chaotic treatment procedures in the early stage. For example, patients with other diseases who also have fever symptoms flood into the fever clinic. Cross-infection; limited time for pre-inspection and triage, so that the quality of screening cannot be guaranteed, etc. The inflexibility of my country's hierarchical diagnosis and treatment system and part of the gaps in the family doctor system have also been exposed in this prevention and control. These comprehensive problems make it impossible for the port of investigation of suspected patients to move forward, and it is also easy to increase the pressure of public opinion. In this epidemic, Internet + medical treatment and offline medical treatment complemented each other, effectively solving the confusion of medical treatment, and fully demonstrating its convenience. Improving the awareness of the Internet + medical care among the people in all regions of our country, and improving the Internet + hospital construction model should become one of the important contents of the construction of the emergency management system for infectious diseases in my country in the future.

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