

From SARS to H7N9: The mechanism of responding to emerging communicable diseases has made great progress in China

Linong Yao, Enfu Chen, Zhiping Chen, Zhenyu Gong*

Zhejiang Provincial Center for Disease Control and Prevention, 3399 Bin Sheng Road, Binjiang District, 310051 Hangzhou, China.

Summary

The outbreak of severe acute respiratory syndrome (SARS) in 2003 indicated that China's existing former mechanism for emergency management was very vulnerable. The Chinese Government has since established a new mechanism for responding to emerging communicable diseases. This paper examined the current status of and developments in China's response to emerging communicable diseases from the outbreak of SARS in 2003 to the outbreak of H7N9 virus infection in 2013. Results indicated that the current mechanism for emergency responses to emerging communicable diseases in China has made great achievements in terms of command and decision-making, organization and collaboration, monitoring and early warning systems, protection, and international communication and cooperation. This mechanism for responding to emerging communicable diseases allowed China to successfully deal with outbreaks of the H5N1 bird flu, H1N1 flu, and H7N9 bird flu. However, a better coordination system, a more complete Office of Responses to Public Health Emergencies, administrative responsibility and error correction, better personnel training, and government responsibility may help to improve the response to emerging communicable diseases. Such improvements are eagerly anticipated.

Keywords: Emerging communicable diseases, department coordination system, Office of Responses to Public Health Emergencies, field epidemiology training program

1. Introduction

In the spring of 2013, humans were infected with the H7N9 virus, and the number of cases increased rapidly. From March 31 to May 31, 2013, there were 132 cases of humans infected with the H7N9 avian influenza virus in China, 39 of which resulted in death (1,2). Afterwards, 5 new cases of infection with the H7N9 virus were reported prior to October 31st, according to the National Health and Family Planning Commission (NHFPC) of China (3). Most recently, 2 new cases of H7N9 infection were confirmed in Hong Kong and 1 case was confirmed in Zhejiang. The Chinese Government and Ministry of Health tried their best to

control infection with the H7N9 virus, and they are still doing so. However, global concerns about public health in China have been sparked and there is a doubt as to whether China's response to emerging communicable diseases has made improvements since the last outbreak of an emerging communicable disease, severe acute respiratory syndrome (SARS), in 2003.

After the outbreak of SARS in 2003, the Chinese Government found its existing mechanism for emergency management to be very vulnerable, and the Government started to consider creating a new mechanism for responding to emerging communicable diseases. In order to promptly and effectively deal with various emerging communicable diseases, a new mechanism for responding to public health emergencies with a unified command, ready reaction, and coherent, ordered, and effective operation had to be established. The establishment of a mechanism for emergency responses to emerging communicable diseases is a key aspect of the response to a public health emergency. China established such a mechanism for emergency

*Address correspondence to:

Dr. Zhenyu Gong, Zhejiang Provincial Center for Disease Control and Prevention, 3399 Bin Sheng Road, Binjiang District, 310051 Hangzhou, China.
E-mail: 87235011@163.com

responses to emerging communicable diseases and has made some progress since the outbreak of SARS in 2003. With the help of this new mechanism for emergency management, China successfully handled the outbreak of H5N1 and H1N1 avian influenza in 2005 and 2009. Moreover, evidence has shown that China's public health response to the H7N9 virus infection was faster and more effective in terms of transparency in reporting, surveillance, screening, and stockpiling of antimicrobials (4,5). This is a result of China's establishment of a mechanism for responding to emerging communicable diseases after the outbreak of SARS in 2003.

2. China's establishment of a new mechanism for responding to emerging communicable diseases

Advanced medicine literally means to practice. After the SARS outbreak in 2003, China established a mechanism for emergency responses to emerging communicable diseases, and has made rapid advances. The government and society have focused on facilities for disease control and prevention that deal with emergency responses to emerging communicable diseases. China has essentially reached its goal of establishing a system of disease control and prevention. Monitoring, early warning, and emergency responses to emerging communicable diseases are key responsibilities and missions of facilities for disease control and prevention.

2.1. Command and decision-making

Since 2003, the NHFPC has sought to create an information network and platform for command in public health emergencies and shift decision-making with regard to emerging communicable diseases from central to local authorities. Therefore, a public health information network was envisioned to cover the entire country and connect every region of the country. In accordance with this vision, the Chinese Government has sought to establish an emergency command system that is unified, effective, ready to respond, and accurate. Although the existing system is not as perfect as that envisioned, obvious improvements have been made, and the quality and efficiency of emergency command and decision-making has improved. This new command and decision-making helped to prevent and control the outbreak of the H7N9 virus infection in 2013.

2.2. Organization and collaboration

Responding to emerging communicable diseases requires cooperation between multiple departments such as finance, agriculture, education, public security, urban management, and forestry. Therefore, good organization and collaboration is needed. Organization of and collaboration in responses to emerging communicable

diseases includes organization and collaboration between central and local authorities, between localities, and between government departments and the Health Ministry. To accomplish these tasks, the Chinese Government established a department coordination system and an Office of Responses to Public Health Emergencies.

Department coordination system NHFPC established a system to coordinate between different departments. The Chinese Government established this system to coordinate among 31 relevant departments to respond to emerging communicable diseases. The department coordination system has effectively enhanced communication of information on emerging communicable diseases among different departments. The system also incorporates prevention of disease emergencies, drills and training, and personnel supervision and testing, representing a considerable achievement of the organization of and collaboration among different departments.

Office of Responses to Public Health Emergencies Organization and collaboration also includes cooperation between different health departments. To better integrate resources, NHFPC established an Office of Responses to Public Health Emergencies, which also serves as the Headquarters for Responses to Public Health Emergencies. Since then, a preliminary system for organization of and collaboration in emergency responses to emerging communicable diseases has been initially established in China. When public health emergencies occur or emerging communicable diseases appear, all types of public health facilities can be adequately coordinated by the Headquarters for Responses to Public Health Emergencies, and an investigation of the cause and determination of a treatment can be promptly performed.

In light of the organization of and collaboration in the response to H7N9, the department coordination system and Office of Responses to Public Health Emergencies helped to improve cooperation between different departments in the face of an emerging communicable disease.

2.3. Monitoring and early warning system

After the outbreak of SARS in 2003, the Chinese Government established a new mechanism of monitoring, forecasting, and providing early warnings of emerging communicable diseases. With the new monitoring and early warning system, NHFPC and provincial health departments can publish information warning of an infectious disease based on results of their analysis in order to facilitate a rapid response. China has made great progress in the establishment of an early warning system for emerging communicable diseases. In particular, *i*) a reporting system covering the entire country has been established, the timeliness

of reporting has been greatly improved; *ii*) information about results of analyses and forecasts of emerging communicable diseases is better shared among different departments; *iii*) advanced early warnings of infectious diseases and emerging communicable diseases have been discussed, and remote sensing and geographic information systems have been introduced in the field of public health.

Advances in the new monitoring and early warning system have helped to improve China's response to emerging diseases. As an example, the new H7N9 virus infection was detected and reported by the monitoring system just before the infection occurred in the spring of 2013.

2.4. Protection

In terms of protection from emerging communicable diseases, the Chinese Government has taken action in 3 areas.

Complete regulation Scientific responses and laws, regulations, and plans for emergency responses to emerging communicable diseases that are tailored to China have been initially established. These policies have helped to create a standardized response to emerging communicable diseases.

Field Epidemiology Training Program A public health system has gradually been established in China. Trained medical personnel, public health workers, and experts in responding to emerging communicable diseases, programs for types of emergency responses, and new techniques and methods for emergency responses can ensure that personnel have the technical proficiency to conduct emergency responses to emerging communicable diseases. In more specific terms, a field epidemiology training program (FETP) is now being emphasized in China. This is the advanced form of training proposed by the World Health Organization. This training enhances monitoring by an emergency response system by high-level training of personnel in field epidemiology to meet the challenge of a disease outbreak or other public health emergency. FETP in China started in 2001 (6), sponsored by NHFPC and the Chinese Center for Disease Control and Prevention (CDC). This is a preferred method of training teams to deal with emerging communicable diseases and can enhance the proficiency of emergency response personnel. China's FETP has recruited 244 students in thirteen terms over the past twelve years. Of these, 184 students in eleven terms have graduated and are now national or provincial level experts in emergency responses to emerging communicable diseases. There are now several provinces with their own FETP, including Zhejiang, Guangdong, Tianjin, and Shandong and Shanghai. Students who have graduated are now playing an important role in responding to emerging communicable diseases. For

example, Zhejiang's FETP (7) recruited 244 students in fifteen terms from 99% of the province's counties. Of these students, 201 have graduated and are all members of provincial teams for emergency responses to emerging communicable diseases and other health event. The FETP graduates have greatly helped to prevent and control the H7N9 virus infection.

Financial support More government funds were allocated for establishment of a system to respond to emerging communicable diseases and actual emergency responses. Thanks to these policies, emergency response facilities have received financial compensation and emergency response funds, enhancing their ability to conduct emergency responses to emerging communicable diseases.

2.5. International communication and cooperation

China has improved its international communication and cooperation with international organizations and countries in terms of responding to public health emergencies. With the help of international communication and cooperation, China can now share the latest information on emerging communicable diseases and easily receive support from or supply support to other regions. For example, China, Hong Kong, and Macau signed a cooperative agreement on responding to public health emergencies in 2005. This agreement provided a basis for cooperation and communication of information on emerging communicable diseases among these regions. To some degree, this agreement has helped to enhance cooperation and communication among these three regions and has led to a more effective response to emerging communicable diseases.

International communication and cooperation allows the world to conduct emergency responses before a pandemic occurs. When the outbreak of H7N9 occurred in 2013, the response by different countries and regions at the same time helped to reduce the impact of the disease.

3. Challenges of and prospects for the response to emerging communicable diseases in China

Although the establishment of a mechanism for emergency responses to emerging communicable diseases in China has made great achievements and helped to control the H7N9 virus in a short period of time, some challenges still remain.

Better coordination system Organization of and collaboration in responses is a key factor for prevention and control of emerging communicable diseases. The system of coordination among different departments and specialized facilities at the local level is still weak and may need to be enhanced.

More complete Office of Responses to Public Health

Emergencies Responses to emerging communicable diseases require support from different areas, so administration of responses to emerging communicable diseases requires comprehensive decision-making ability. Therefore, a more complete Office of Responses to Public Health Emergencies may prove useful.

Administrative responsibility and error correction The key to prevention and control of emerging communicable diseases is to allocate responsibility. Mechanism of administrative responsibility and fault rectifications such as responsibility system of "government - health administration department - medical institution - medical staff" may provide a solution.

Better personnel training A shortage of trained personnel and insufficiently trained personnel are major problems hampering the development of facilities for disease control and prevention (7-9). One potential solution is for administrators of responses to public health emergencies and experts to regularly conduct training and emergency drills to deal with emerging communicable diseases.

Government responsibility The Government should be responsible for preventing and controlling emerging communicable diseases. Therefore, more studies are needed to determine what types of action the Government should take during an outbreak of an emerging communicable disease.

In conclusion, China's response to emerging communicable diseases improved significantly after the outbreak of SARS in 2003, with improvements in command and decision-making, organization and collaboration, monitoring and early warning, protection, and international communication and cooperation. Thus, China successfully dealt with outbreaks of the H5N1 bird flu, H1N1 flu, and H7N9 bird flu. This was especially evident in the spring of 2013, when China successfully detected and rapidly controlled new cases of H7N9 bird flu (10) and Zhejiang dealt with its first case of H7N9 this autumn. However, a better coordination system, a more complete Office of Responses to Public Health Emergencies, administrative responsibility and error correction, better personnel training, and government responsibility may help to improve China's response to emerging communicable diseases. Such improvements are eagerly anticipated.

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