Chapter 2: People's Republic of China

Brief Introduction of Chinese Infectious Disease Reporting Information System

Jin Lianmei, Ni Daxin

1. History of Chinese Infectious Disease Reporting Information System

Chinese infectious disease reporting information system was first established in 1950s. During last several decades, the reporting information system has undergone dramatic changes and constant improvements. From 1950s to the mid-1980s, all kinds of hospitals filled the infectious diseases reporting cards for identified cases, and posted them to the local Health and Epidemic Prevention Stations. Then, the Epidemic Prevention Station of county level posted it monthly to district or municipal level, which similarly posted them monthly to that of provincial level, and subsequently to the Chinese Academy of Preventive Medicine. Finally, the national report was developed and posted to the Ministry of Health.

During mid-1980s, as computer technology was introduced into transportation process of infectious disease information, the mailing way of report cards was replaced. This greatly shortened the reporting time from the grassroots to the central agency. Several days could be saved from the county level grassroots to the Chinese Academy of Preventive Medicine. This system lasted for 17 years until 2004.

Although the system shortened the reporting cycle of infectious disease information, it did not essentially change the way of monthly reporting, which followed by lack of basic data of cases and information delay, and thus, could not achieve timely warning and real-time monitoring of epidemic outbreaks and public health emergencies.

2. Previous Lesson from SARS Outbreak and the Information System Requirements

In early 2003, the most profound lesson learned from SARS outbreak was lack of information channels and transparency. Hence, the Chinese government decided timely that the national disease prevention and control system should be primarily established within 3 years. One of the most important contents was developing a new monitoring system for infectious diseases and public health events to collect the information, track the route of disease occurrence and development, and meet the needs of monitoring and early warning for epidemic outbreaks and public health emergencies.

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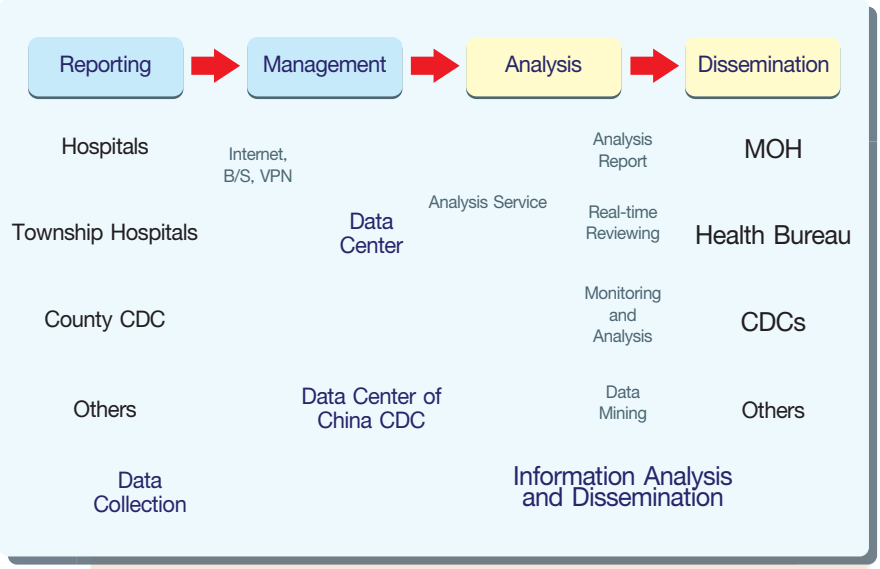
In China, the national disease prevention and control system includes "***five-level network***", which consists of state, province, district/city, county and township. The monitoring system requires the establishment of local area network at national, provincial and municipal CDCs, and computer workstations at county and township level CDCs to perform disease reporting and management. At the regional level, a regional information sharing system should be constructed to realize the information sharing among various types of users at each level. As for reporting of infectious diseases and public health events, the "case management, real-time, on-line" principle is adopted, which requires fundamental change from the old monthly reporting and county-based data collection. It is a significant conceptual change of disease prevention and control.

3. System Construction and Characteristics

According to the above presumptions, the system was initially designed during 2003, and launched on 1 January 2004. It can be seen that cases of infectious diseases discovered by all kinds of medical institutions at each level should be directly sent through internet to the central data center which located at China CDC without any delay. CDCs and health authorities at each level can search with accreditation on cases of local infectious diseases or public health events occurred at same time. Besides, neighborhood data can also be acquired according to their needs.

There are three significant changes of the new reporting system compared to the old one. First is change in the reporting pattern of infectious diseases, resulted from the idea shift of disease prevention and control. The existing system highlights more on early monitoring and warning of epidemic outbreaks and public health emergencies. The requirement on real-time reporting of disease cases improves the sensitivity of discovering outbreaks and unexpected events, and saves valuable time for intelligence warning and control. Second is that the previous reporting of aggregated data was replaced by the case-based reporting pattern, which outlines a clearer, directly perceived and detailed disease information for health authorities and CDCs. It also allows analysis through complex systems, such as use of Geographic Information Systems to portray the spread and transfer of diseases among different regions. Third is the application of internet technology. The data transmission of intelligence and emergencies applies the latest internet technology, and ensures rapid transportation and data accuracy.

The process of data verification is easier to complete. Hospitals may report suspected cases to prevent possible omissions and conduct possible early warning. Generally, CDCs at each level must check the reported cases from hospitals; sometimes they also have to not only verify and revise the data, but also investigate, handle and track the suspected cases based on actual needs. Regarding the utility, analysis the data can be done depend on the purposes; whole data including unconfirmed cases, or only confirmed cases can be selected.



4. System Effectiveness and Coverage

To date, more than 97% of county and above county level hospitals and 80% of township hospitals are able to report infectious diseases and public health events through this system. Over 3,000 CDCs and Health Bureau at each level can acquire data with authorization to obtain infectious diseases situation in both local and neighboring regions, and to take corresponding measures.

The system improves the reporting rate of infectious diseases. Through the formal operation of this system, there are about 15,000 notifiable cases reported every day to national data center. In past four years, the annual report of infectious disease cases reached 400-500 million.

The system also increases the sensitivity of notifiable infectious disease surveillance. Moreover, the real-time reporting of cases shortens the time from case diagnosis and discovery to data reporting.

In addition to the infectious diseases and public health events reporting information system under operation, more than 10 other post-secondary disease reporting systems have been successfully established and operated, such as Measles Surveillance System, TB Monitoring and Management System, HIV/AIDS Monitoring and Management System and so on. These systems have linkage with the infectious diseases reporting system. Now, the infectious disease system is still under comprehensive construction. China has become one of the world's few countries which conducts comprehensive surveillance of infectious diseases. The successful operation of the system improves China's management for infectious diseases, and enable China's infectious disease prevention and control to access to a new period of active early warning, instead of passive reporting.

5. Advantages and Disadvantages of China's Infectious Disease Surveillance System

5.1 Main Advantages of China's Infectious Disease Surveillance System

As for the top-level design, all systems were united and constructed on one platform. In the process of system construction, standardization of data and IT technology were considered to ensure data exchange among different systems.

As an important component of public health system, the construction of infectious disease reporting information system is under direct leadership of Chinese government, designed and operated by China CDC and its subordinate institutions, which is hard to apply in other countries.

CDCs at each level conduct verification and audition of the reported data, which ensures data quality. The system enables data sharing among CDCs, health authorities and hospitals.

5.2 Disadvantages

There is neither national laboratory network nor electronic laboratory system for most diseases. Laboratories can not carry out internet data exchange or communication.

Fail to establish national health data dictionary and national minimum data standards. Misunderstanding of data elements and range exist among different systems, which result in difficulties on data exchange at national level, especially in different systems or areas.

6. Application Practice

6.1 Automatic Early Warning Information System of Infectious Diseases

Since the national data is saved in web server, real-time data can be retrieved conveniently. National auto-detection system for early warning, which had been established during August 2006, is now used in the entire country.

It is based on historical data, which source of information is stable and easy to operate. The national infectious diseases data center uses the moving percentile method: seven days as an observation period and forecast every day. Data type is the number of reported cases (statistic according to the report date). Retrospective time of baseline data is three years, deviating two weeks as an observation window. Threshold of detection can be selected according to local situation, for example P50, P60, P70, P80 or P90.

If the system detects the value beyond the created threshold, it will send a signal about where and what happened by a short message or email to the related person. The person should verify the signal whether it is a problem through a different method.

6.2 Index Cases

Another focus on monitoring and analysis work is paying more attention to index cases of unknown pneumonia and other unknown deaths. On 26 April 2004, China's county and above county level hospitals launched monitoring and reporting work for unknown pneumonia and other unknown deaths. The purpose is to discover SARS, human infection of Highly Pathogenic Avian Influenza and other respiratory diseases or other possible emerging infectious diseases at early period, and improve the sensitivity of the monitoring system.

7.Prospect of China's Disease Surveillance System

The new system launched in 2004 enabled China to access into a fresh period of disease surveillance system construction, and improved China's capacity of disease prevention and control. In the future, the current disease-based system is expected to be gradually developed into a system that carries out comprehensive surveillance of health issues, including not only surveillance of diseases, but also health related factors and risks that influence disease occurrence and development.