Feature

Demand Analysis and Management Suggestion: Sharing Epidemiological Data Among Medical Institutions in Megacities for Epidemic Prevention and Control

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Abstract: During the prevention of coronavirus disease 2019 (COVID-19), epidemiological data is essential for controlling the source of infection, cutting off the route of transmission, and protecting vulnerable populations. Following Law of the People's Republic of China on Prevention and Treatment of Infectious Diseases and other related regulations, medical institutions have been authorized to collect the detailed information of patients, while it is still a formidable task in megacities because of the significant patient mobility and the existing information sharing barrier. As a smart city which strengthens precise epidemic prevention and control, Shanghai has established a multi-department platform named "one-net management" on dynamic information monitoring. By sharing epidemiological data with medical institutions under a safe environment, we believe that the ability to prevent and control epidemics among medical institutions will be effectively and comprehensively improved.

Key words: epidemic prevention and control, big data sharing, medical institutions, megacities

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0 Introduction

When the Chinese government is taking the extraordinary step of locking down a big city because of the coronavirus disease 2019 (COVID-19), South Korea and the United States reported a surge in COVID-19 cases, and an outbreak has spread rapidly and globally^[1-3]. As Gedela, the National Health Service (NHS) consultant physician from London, mentioned, one reason for the World Health Organization's declaration of this outbreak as a public health emergency of international concern was to try to limit the spread of virus outside densely populated countries with weaker health systems^[4]. We fully agree with Gedela's opinion that COVID-19 highlights the need of greater financial and diagnostic supports for global health care. Besides that, based on lessons learned from the practice in preventing COVID-19, we would like to focus more on the support strategies such as epidemiological information

sharing, mainly for medical institutions in megacities with a population over 20 million.

Health institutions in densely populated metropolises like Shanghai undergo a comparatively high risk due to the significant population mobility, and we may have twice the risk of spreading when the Spring Festival population flows collided with the epidemics^[5]. Since controlling sources of infection and cutting off transmission are critical methods for COVID-19 prevention, strict pre-examination and triage measures including epidemiological survey and temperature measurement need to be taken before patients see a doctor^[6]. However, patients crowd at the gate of the hospital, with the shortage of medical staff and personal protective equipment, which increases the infection risk. In addition, because the pre-examination staff could not confirm personal information provided by patients, they often have to check repeatedly during the epidemiological survey. All these inevitably increase the cost of avoiding any potential infection. The history of respiratory and gastrointestinal symptoms will definitely help improve the efficiency of epidemic diagnoses, while an inter-connected and collaborative healthcare joint information system within all medical institutions has not

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been established yet. The lack of system leads to the difficulty in early warning and treatment.

Considering the challenges mentioned above, we should overcome the obstacle in getting epidemiological data through a steady and reliable approach, and establish a multi-department dynamic information sharing system, which will effectively and comprehensively improve the ability of medical institutions in metropolises for epidemic prevention and control.

According to the experience of foreign countries, health authorities have been empowered to collect personal data for public health purposes, and the information barrier among different government sectors has been broken during the disease outbreak. In the early warning management system of Centers for Disease Control and Prevention (CDC) in USA, all companies, institutions and individuals involved are required to provide key epidemiological information to certain departments and the smooth sharing flow of information is technically ensured between different government departments^[7-9]. In addition, an “Early Warning and Response System” in the European Union (EU) is designed to build a continuous communication channel among the authorities of member states when any major public health events happen^[10].

In fact, there is also a clear and solid legal basis in China, which permits medical institutions to collect patient epidemiological information during the outbreak. Emergency Response Law of the People’s Republic of China, the Law on Emergency Management and the Regulations on Preparedness for and Response to Public Health Emergencies, as well as the Law on the Prevention and Treatment of Infectious Diseases, has given medical institutions the access to specific personal information for controlling major infectious diseases. During the COVID-19 outbreak, the Cyberspace Administration of China and the Ministry of Industry and Information Technology stated clearly that China would further use big data to accurately prevent and control the spread of pneumonia caused by COVID-19, and mentioned that the quality of epidemic data report and the effectiveness of inter-departmental information linkage should both be continuously strengthened; the General Office of National Health Commission of the People’s Republic of China also declares that a system which enables exchange, aggregation, and integration of multi-source data from transport, communication, health or other public departments, needs to be established as quickly as possible.

Based on the relevant rules and policies, Shanghai, a pilot example of promoting precise epidemic prevention system, has made many efforts in breaking the “data barriers” between various departments^[11-12]. In order to share the information from different government sectors, a multi-department dynamic information monitoring platform called “one-net management” has been es-

tablished, which integrates accurate health information and travel history of citizens. With the application of big data technology, an official Health QR Code classified in red, yellow and green color was launched on 17 February 2020. It is easy to show the residents’ epidemiological information verified with QR Code at any community or expressway checkpoint, and it is a reliable and simple approach for administrators at offices, residential areas and other public places to check health condition of anyone who enters or leaves the city. By scanning the codes online, the capacity of medical and health management is strengthened against the coronavirus epidemic.

Taking the latest online service into account, we put forward the following suggestions about sharing epidemiological data to strengthen epidemic prevention and control in key regions.

1 The Sharing of Epidemiological Data Among Medical Institutions Should be Guided and Supported by the Government

Considering the high requirements of health institutions for epidemiological information of patients, the government is recommended to give these institutions access to the residents’ epidemiological data including physical conditions, travel history and contact information by a unique identity such as ID card during the epidemic prevention period. If medical institutions are allowed to enquire into such information at any time, the credibility of patients’ epidemiological information will be guaranteed, the medical cost will be reduced and medical staff will be relieved of their burden.

2 Shanghai Big Data Center Should Upgrade the Existing Health QR Code According to the Needs of Medical Institutions

Health QR Code has become a secure tool for local manufactures and companies to closely monitor health conditions of their employees. Considering the demand diversity of health institutions for epidemiological information, Shanghai Big Data Center may provide a special version of Health QR Code for certain requirements during the epidemic prevention period. An improved version could further be implanted into on-line appointment and registration link of medical institutions, ensure advanced individual identification and verification, substantially reduce the risk of cross-infection in hospital, and promote effective and efficient management and stewardship.

3 Shanghai Municipal Health Commission (MHC) Should Provide Consultation and Advice on the Selection of Treatments to Medical Institutions

In consideration of the fact that some patients have unnecessary repeat consulting in multiple hospitals, an early epidemic warning and a fast diagnosis could be carried out correctly if the doctors are sure to be clear on patients' history of respiratory or digestive treatment. However, the information system of health institutions runs independently with little direct communication with others, so it is unavailable to exchange and share patient-level electronic health information between different hospitals. We recommend MHC to perform integration with the platform established by Shanghai Big Data Center and MHC's health information, and develop a joint health defense system, so the real-time records of patient treatment can be shared rapidly within various medical units.

Above all, the prevention and control of epidemic is a complex health task for medical institutions with difficulty in identifying patients and verifying epidemiological information. A joint defense system with big data integration and information exchanging is needed to actually break down the barriers in health institutions, to eliminate hidden dangers or security threats of information, to reduce the repeated consumption of medical resources, and to truly implement the early detection, early treatment and early blocking of disease outbreaks like COVID-19 epidemic.

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