

Research on the Operation Mode of Public Health Platform based on Artificial Intelligence and Big Data Technology

Yuqing Wang

School of Finance, Anhui University of Finance and Economics, Bengbu, China

Abstract

The construction of public health platform has an important impact on the improvement and development of my country's public health emergency management system. Based on the analysis of the connotation and construction goals of the public health platform, this paper explores the main problems existing in the construction of the public health platform, and finally proposes the operation mode of the public health platform based on artificial intelligence and big data technology.

Keywords

Artificial Intelligence; Big Data Technology; Public Health Platform; Operation Mode.

1. Introduction

In recent years, some social public health emergencies have occurred frequently in various parts of our country. Emergencies endangering public health usually refer to various social emergencies such as various unexpected diseases or major infectious public infectious diseases, mass emergencies of various unknown causes, major causes of death, diseases, accidents, etc. Harmful social danger and behavior that seriously affects and significantly affects people's sudden violation of public property health and safety. The most common manifestations of public health emergencies are strong suddenness, cumbersomeness, high social diffusion, high harm, wide influence, unconventional and international interaction. The rapid outbreak of each large-scale public health disaster will inevitably bring huge and serious indirect economic losses and serious casualties to the development of the country's rural economy and the lives of people in the disaster-stricken areas. Therefore, it is very necessary to be able to quickly and accurately perceive various environmental health emergencies in the early stage of the incident. Through artificial intelligence methods and the use of Internet big data technology, relevant dynamic information such as sudden environmental public health events can be discovered as soon as possible. And locate the affected people, show relevant local policies, and adjust relevant local departments. Start prevention and control projects through information methods. It will be the task and key direction of current and future smart city construction.

2. The Connotation and Construction Goals of the Public Health Platform

The public health information service platform integrates the government, medical institutions, communities and other major departments, with the goal of serving the people and maintaining national health, integrating medical information, coordinating medical resources, and promoting public health exchanges in various regions.

One of the key construction and goals of the public health platform network is to further strengthen the platform information network interconnection and interoperability and realize data sharing, including the following contents. First, break the information gap between departments, strengthen the vertical two-level management of the department, open up information systems at all levels, accurately and comprehensively obtain local epidemic data, and report to the National Center for Disease Control and Prevention in a timely manner, so as

to effectively reduce the error of repeated reporting of events. Secondly, strengthen the construction of the information system for the quality and safety control of public health emergencies. Implemented and implemented the national emergency health emergency rescue work service standardization work requirements, effectively and solidly promoted the construction of the provincial-level professional emergency treatment quality control analysis center platform, and actively standardized the quality control monitoring of medical institutions, disease prevention and control networks, etc. Analysis, quality control performance evaluation mechanism and national emergency health environmental incident treatment and emergency system work standard agency certification and national health product quality supervision agency. Quality control evaluation, etc. Second, improve the efficiency and standardization of incident reporting. Make full use of disease emergency treatment information, medical emergency treatment organization information system and major infectious disease emergency prevention and control decision-making information, build and improve the emergency dispatch command center network of provincial health and administrative departments as the core hub, covering the city's disease prevention and control supervision agencies, medical and health A three-in-one system of disease health supervision, emergency response, command and coordination decision-making system for institutions and medical service and health technical institutions. Thirdly, it improves the reliability and timeliness of the comprehensive maneuver and disposal coordination ability of the emergency support system. On the mobile phone, the real-time reporting and querying of epidemic events and the sending of early warning reports under the emergency command system for health emergencies are realized. Allocate reporting task resources and early warning query platform resources to meet various actual information work needs of mobile phone users. Finally, promote the normalization of the city's health emergency risk quality control and disposal work. In accordance with the management and coordination of medical institutions, disease control organizations, health and safety supervision and other institutions to do a good job in the implementation of the standard system of emergency technical work for health accidents, regularly carry out safety and quality control analysis, quality control evaluation, and quality control work evaluation, and give full play to The role of comprehensive guidance and evaluation of technical health and safety to establish emergency rescue quality risk control testing centers in hospitals at all levels. The informatization system refers to the construction and continuous improvement of the national health emergency quality control management platform and risk assessment and early warning system, and the implementation of the national emergency health emergency prevention and control work to build a risk quality control system with full-cycle and full-dynamic process monitoring. .

3. The Main Problems Existing in the Construction of Public Health Platforms

Since the outbreak of the SARS virus crisis in 2002, many problems have been exposed, such as backward development of public health, imperfect medical system, uneven distribution of medical resources, and blocked information flow. Highly contagious infectious disease. To this end, my country plans to build a national public health information system in three years, and establish an emergency response mechanism for public health emergencies and related medical systems. At present, the new crown pneumonia epidemic is still prevalent in my country, and the spread of the epidemic has brought an indelible impact on the country. my country's current public health emergency resource allocation mechanism still needs to be improved, mainly in the following points:

3.1. Lack of Effective Preventive Measures Against Unknown Infectious Diseases

The current public health platform focuses on remedial measures after major public health events and lacks preventive measures beforehand. Prevention is better than cure, and actively doing prevention is the most practical, most beneficial and most economical measure. In addition, the government itself does not pay much attention to public health, and there is no clear division of responsibilities and scope, which leads to the situation of who is responsible for problems. However, current public health platforms cannot effectively identify suspected infectious diseases. Therefore, the public health information service platform we have built is based on artificial intelligence and big data technology, which can do a good job of public health classification, screen medical cases in various places 24 hours a day, and take relevant measures in advance, just in case. Suspected cases of infectious diseases. Contact designated hospitals to conduct in-depth diagnosis of patients, try to avoid omissions, and minimize risks.

3.2. Lack of a New Public Health Information Service Platform that Collects, Stores and Analyzes Big Data

A public health platform is actually an information system with massive data. Health big data is typical big data, which has the characteristics of volume, type, speed, value, etc., and comes from a wide range of sources: public health data related to medical institutions, pharmacies, clinics and other medical and health service institutions and schools, pension institutions, supermarkets, farmers Market and other key places. However, my country has a large population and a wide area. The number of people in a city's hospitals, outpatient clinics and other medical places is increasing every day. In the face of such a large amount of complex and huge big health information data, the common data management methods have gradually been unable to fully meet the accurate collection, storage and visual analysis of big data resources. It is necessary to discover and use a new and effective big data app, and effectively use artificial intelligence to filter the daily collected data and extract useful information.

3.3. Lack of Channels for Regional Coordination and Communication

Because the local government has established a local public health information service platform, the data collection is regionalized and decentralized, it is difficult to centrally understand the medical resources of the country, and it is controlled by the local government, and it is difficult to allocate medical resources across regions. , the response to public health emergencies is inefficient and difficult. In addition, the data of medical resources in various regions is asymmetric, and the information transparency is not high, which leads to the lack of timely and close data circulation of relevant departments in various regions. Therefore, a public health information service platform for the exchange and sharing of medical resources across the country is needed, which can effectively coordinate the cooperation between various regions and government departments, and realize the optimal allocation and maximization of medical resources.

3.4. The Platform Service Lacks Iterative Capability

When responding to public health emergencies, our existing platform is advanced in units of years, and this iteration speed is difficult to respond to emergencies. We need to modify the promotion period of the platform according to the actual situation, and strive to promote it on a monthly basis.

3.5. The Platform Service Connection Capability is Limited

The platform construction mainly relies on the government's resource informatization and management functions, and the number of services for urban enterprises and citizens is limited

and cannot be comprehensive. Under the influence of the new crown epidemic, the business capacity of the platform appears to be insufficient.

3.6. Processing of Data by Existing Public Health Platforms

The amount of data information is too large and difficult to digest. Since the hardware foundation and software applications are still in the development stage, the amount of data that the platform can handle is limited. When a public health emergency (such as the new crown epidemic) occurs, the platform will face a large amount of data in a short period of time. These massive amounts of data are a huge challenge to our data processing system.

The degree of digitization of data is low, and the authenticity is difficult to be guaranteed. The collection of epidemic prevention and control data still requires manpower, which brings problems such as timeliness and accuracy to the data. The platform needs to improve the data collection capability in the data collection system, and try to avoid manual data collection when it is not necessary to ensure the timeliness of the data.

The forms of data are different and the degree of standardization is low, which brings difficulties to data processing. In the case of sudden infectious diseases, data collection can only be carried out in the community, resulting in different collection methods of various data, which has an impact on the form of data, often resulting in the mixing and standardization of static data and dynamic data. Data aggregation and analysis presents great difficulties.

The data collection channels are not unified. Due to the needs of epidemic prevention and control, the data collection channels are scattered and fragmented, resulting in multiple sampling and overlapping of data. This will increase the work pressure at the grassroots level, and it will be difficult for citizens to adapt to such data collection methods, resulting in rebellion. Under the background of the new crown epidemic, citizens are facing huge psychological pressure. If data collection at this time also puts pressure on citizens, it may have more serious consequences.

The flow of data is limited. When a public emergency occurs, due to the need for epidemic prevention and control, the data obtained by the grassroots cannot be communicated quickly with high-level agencies such as the government, and the data communication is not smooth. It brings great challenges to the post-processing of the data, and also affects the timeliness of the data. The degree of reference for the results of the final analysis of the platform is still open to question. How to make data flow quickly and efficiently without violating epidemic prevention and control regulations is a challenge we need to face.

4. Construction of Public Health Platform Model based on Artificial Intelligence and Big Data Technology

4.1. Main Functions of the Public Health Platform based on Artificial Intelligence and Big Data Technology

The public health joint prevention and control intelligent management platform can realize the informationization of early warning, prevention, disposal, and coordinated management of public health events. The main functions of the platform are as follows:

The first is to build a threat perception system covering the whole society. By relying on Internet information technology and the information system, disease control system, medical system, quarantine and legal monitoring system of the grass-roots health and health commissions across the country, the seamless interweaving and connection of information on major emergencies or important public health emergencies in each jurisdiction can be realized. Early detection and detection, early treatment and reporting, early effective monitoring and early warning, and early prevention and control. In the face of emergencies, the front-line

situation can be reflected in a timely manner to ensure that the reported information is true, accurate and real-time.

The second is to form a multi-level and multi-departmental joint prevention and control command system. By connecting with the information systems of various functional departments of the government, it can realize the close cooperation of multiple departments, and form an integrated linkage mechanism of efficient scheduling and information-assisted decision-making, so as to achieve the purpose and control of effective prevention.

The third is to build a basic life security system in emergencies. Through the connection between the Internet and the commercial system, the logistics and the supply of basic living materials in the epidemic area are guaranteed, and the basic life of the people is guaranteed.

4.2. Construction of a Large Platform of Smart Health Management based on Multi-Sensory Dimensional Data for Joint Defense, Patrol, and Joint Control of Community Public Management Health Services

In order to quickly and effectively discover and control the characteristics of clinical conditions and actively organize the prevention of various infectious disease outbreaks, reduce the burden of various actual diseases and repetitive processing workloads undertaken by front-line personnel in the current clinical and front-line department work process. It is necessary to learn how to make full and reasonable use of various modern technical means such as big data, 5G, Internet of Things, artificial intelligence collaborative computing network, etc., and integrate the current clinical and relevant information systems between various departments and corresponding clinical departments. Department, sorted out the daily work responsibility system and personnel division interface between each department. In this way, a relatively complete and effective national system can be comprehensively established that can integrate national emergency information reporting, risk analysis, early warning and detection, medical malpractice prevention and treatment, and emergency technical service support. An integrated application platform for joint prevention, early warning and joint control and comprehensive health intelligent medical emergency and management for key public and hospital tertiary health service units. The application technology architecture of the whole system can be roughly divided into four layers: information base layer, data layer, application layer and platform management and operation technology support. The security and confidentiality standard system of the national information platform. The basic layer also includes the main communication transmission connection lines and information infrastructure, and is equipped with information resource computing, storage pool and network resource pool with the corresponding national standard system. In addition to the required connection to the local tertiary health and disease control center database and other types of hospital database information related to the Internet designated hospital database, the data layer must also include other required connections for local joint prevention monitoring or joint control. The local government industry data information related to the local relevant government industry functional department databases and various user data of Internet-related enterprises connected to local Internet users and relevant Internet department websites.

4.2.1. Application Layer

The application layer will focus on the risk assessment and rapid detection of major epidemic hazards, and medical emergency treatment services, and correspondingly integrate and develop application function modules such as real-time epidemic notification, emergency rescue support, joint prevention and control management, etc. Process-oriented. The public of the public service is mainly to realize the functions of real-time disclosure of hospital information, timely notification of the epidemic situation, real-time release of technical solutions for diagnosis and treatment, notification and announcement, and refutation of rumors. , community service stations, heads of village health centers and other grass-roots

responsible subjects, and strengthen the county-level comprehensive management functions with the grass-roots local government such as publicity, emergency, public security, transportation, community, communications, education, commerce, and the Civil Affairs Disabled Persons' Federation. docking. Through the connection of big data and the design of the sharing and exchange mechanism, various joint defense and joint control functions such as unified command and mobilization, emergency organization and management, emergency resource allocation, rapid distribution of materials, notification, early warning, assessment and feedback are realized.

Main business external service functions: information collection and release: timely summarize and report all confirmed cases, suspected diagnosed cases, severe cases, cured cases, and dead cases, and draw an epidemic map, which is more accurate and intuitive, and avoids simply listing the epidemic data. Information; carry out classified management and dynamic release system; publicize and introduce in detail the types, characteristics, prevention and control measures and related requirements of virus infection. The main business management functions of the internal management system: data information collection: data is directly generated by the information system of designated hospitals in various regions of the country and entered into the information platform; data statistics review: timely analysis and summary of designated hospital data, and the results are reported to the release platform in time after review and confirmation; big data Early warning analysis: analyze and monitor the characteristics of the population and potential patients in key areas, analyze and share the research results with relevant local law enforcement departments in real time, issue prevention and control early warnings in a timely and effective manner, and do a good job in epidemic prevention and control.

4.2.2. Data Layer

The linkage big data technology is fully embedded in the open public platform for data collection of public health emergencies. Public health event surveillance data sharing management. The shared platform can rely on the linked big data technology to build a framework for a unified open public service platform system based on the COVID-19 big data platform. Through unified integration of the new crown pneumonia epidemic data from various domestic and foreign data sources, unified indexing, data analysis, extraction, classification and merging, using resource description and framework mechanism to describe, establish a database based on computer-based rapid identification of information Link mechanism and database language, real-time release and synchronization of relevant data to the relevant webpage database, provide user access interface and embed it into the user's website navigation interface in real time, so that user data can be quickly browsed, searched and retrieved through domestic and foreign Internet search engines, Promote efficient interconnected data exchange analysis and in-depth application of data mining among global COVID-19 data.

Establish a comprehensive intelligent service management technology platform for community public management, health and joint defense, patrol, and control, fully integrate or utilize the original various information-based integrated management technology systems in the community, and reconstruct the information-based workflow with the technical ideas of the modern system intelligent management platform . As in the design of the "judgment detection-internal" module, using large biological sample data, artificial intelligence algorithms, and blockchain technology, through the establishment of an infectious disease database, a designated hospital database, a database of diagnosis and treatment testing institutions, and a database of scientific research experts to integrate diseases from all over the world. The control center and various testing systems, designated hospitals, scientific research institutions, and third-party monitoring institutions have established a "smart brain" mechanism for epidemic risk determination, and shared epidemic data with relevant domestic authoritative expert

teams and third-party testing and research institutions. Experts, professors and leaders of various professional prevention and control institutions make comprehensive judgments and suggestions on the development of avian influenza epidemics and forecast and analysis of development trends to avoid serious delays in the prevention and control of infectious diseases.

4.2.3. Application Layer

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4.2.4. Operation Layer

Using Internet big health data, artificial intelligence algorithms, and blockchain technology, establish a national infectious disease database, a designated hospital database, a diagnosis and treatment testing institution database, and a scientific research expert database through the Internet, and integrate with the major systems of the CDC, designated hospitals, and scientific research. Institutions and third-party inspection agencies have jointly established a data sharing mechanism for the "smart brain", an automatic disease epidemic determination platform, and cooperated with the national expert database in relevant fields and medical testing professional institutions to share relevant epidemic data, and listened to relevant experts, scholars and staff of other professional institutions. The judgment of the epidemic situation and the analysis of the trend should be carried out to avoid blindly delaying the prevention and control of the disease. At the same time, through strengthening the construction of software and hardware to form an organizational guarantee mechanism system for disease epidemic emergency prevention and control, strengthen the connection with relevant higher-level government departments and enterprises, and form material resources guarantee, policy system guarantee, human resource management guarantee, technical support guarantee, spiritual guarantee A three-dimensional and all-round guarantee work mechanism supplemented by support and guarantee. and manufacturers.

Under the correct operation of the technical operation layer personnel, after the patient is diagnosed and admitted to the hospital, the disease information will be automatically sent to the corresponding communication equipment management service department in real time, and the patient's recent main body organ activity trajectory information can be inquired, and the hospital can correspond to the information. The communication management and other departments of the business share and use it with each other; it is sent to multiple departments such as railways and traffic law enforcement in the jurisdiction, and the railways, traffic supervision and other relevant departments jointly coordinate and send it. And clearly inform the relevant passengers to do a good job of on-site isolation and safety protection knowledge; send it to the township and street community where they are located, and inform their family

members to take corresponding disinfection measures on the spot or do relevant disinfection and isolation disposal work; communicate with county-level public security departments, street communities Report the situation of key epidemic areas and strengthen supervision and implementation.

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