

Research on Public Management of Health Examination in Centers for Disease Control and Prevention

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Abstract: *In the face of the social environment with the rapid development of population aging, ordinary social residents may suffer from chronic diseases such as diabetes, hypertension, cerebral thrombosis, coronary heart disease, rheumatic heart disease, respiratory diseases, etc., so regular physical examination for middle-aged and elderly groups and young groups has become an important direction of the CDC's public management. Relying on big data mining technology, C/S (Client Server) architecture, SQL server database and other software development technologies, we will build an information management system for the health examination of the Centers for Disease Control and Prevention. We will strengthen the systematic input and management of personnel registration, examination photography, project sampling, examination results, and review results, effectively improving the public management quality of the health examination of the Centers for Disease Control and Prevention.*

Keywords: Centers for Disease Control and Prevention; Health examination; Public management; research.

1. INTRODUCTION

As an important institution for local health service management, the Centers for Disease Control and Prevention need to establish a service system for residents' health examinations, disease intervention, and prevention through big data mining technology and cloud service platforms. Especially in underdeveloped areas, the information management system construction of disease prevention and control centers is lagging behind. In terms of collecting, inputting, and managing residents' health examination information, most of them still use document text and Excel tables for manual entry and organization of examination information. The network and hierarchical mode of management of various examination indicators is not in place, and based on this, a scientific public health system is formulated. Developing a public management service system for health examinations, setting up management modules such as personnel registration, result statistics, and result evaluation for different examination items, and conducting comprehensive analysis and evaluation of the health examination results of the Centers for Disease Control and Prevention can achieve the goals of residents' health examinations and disease prevention.

2. HISTORICAL BACKGROUND AND IMPORTANCE OF HEALTH EXAMINATION AT THE CENTER FOR DISEASE CONTROL AND PREVENTION

The health examination conducted by disease control institutions is a highly valued content in every country. In European and American countries, relevant institutions have been established for the health examination and disease prevention of citizens, and the public management model of health examination has been relatively mature. We need to improve national health policies and provide comprehensive and full cycle health services for the people. In May 2021, the National Bureau for Disease Control and Prevention was established, indicating that the country "places greater emphasis on prevention and health promotion, strengthens prevention and control of major diseases, actively responds to population aging, and improves the health service system." In the new era, China's disease control institutions no longer focus solely on disease prevention and control, but instead take "health examinations" and "public management" as the new work centers.

The earliest medical examination conducted by disease control institutions in China can be traced back to the "Regulations on the Administration of Public Place Hygiene" issued and implemented by the State Council in 1987, which states that "personnel who directly serve customers in public places must hold a" health certificate "before they can engage in their own work. Those who suffer from dysentery, typhoid fever, viral hepatitis, active pulmonary tuberculosis, purulent or exudative skin diseases, and other diseases that hinder public health shall not engage in work that directly serves customers before being cured It should be said that disease control institutions

have played an important role in the preventive physical examination work of employees in public places. Currently, with the accelerating process of population aging in China, the proportion of the elderly population is increasing. As of 2022, the elderly population in China has exceeded 280 million. With the change of lifestyle, more and more diseases are showing a trend of younger development. More and more people suffer from chronic diseases such as diabetes and hypertension, and national health has been greatly threatened. This severe situation has brought enormous pressure to the Centers for Disease Control and Prevention, which must strengthen public management in order to improve the prevention and control of chronic diseases.

3. THE SHORTCOMINGS OF HEALTH EXAMINATION MANAGEMENT IN CENTERS FOR DISEASE CONTROL AND PREVENTION IN THE ERA OF BIG DATA

3.1 The formulation of the public management system for health examinations is not scientifically sound

At present, the health examination standards of disease control centers in different regions are not unified, and there are differences in registration information, examination items, entry information content, and examination process. Firstly, the country has not introduced clear health examination regulations for the Centers for Disease Control and Prevention, and the Centers for Disease Control and Prevention have not developed a unified health examination system. Instead, according to the physical examination needs of ordinary residents and local socialized management service requirements, physical examination, electrocardiogram, chest X-ray, B-ultrasound, hematuria routine, fecal occult blood test, blood biochemical examination set, tumor marker detection, and other physical examination items are set up. In addition, the admission system for health examination staff at the Centers for Disease Control and Prevention is not perfect. Although the "Regulations on the Management of Medical Institutions (Revised in 2022)" stipulate that staff participating in the experience should obtain a practicing physician qualification certificate, there is no unified admission standard in the actual operation of the Centers for Disease Control and Prevention, which may lead to risk issues in public management of health examination[1].

3.2 Insufficient construction of the information management system for health examinations in the Centers for Disease Control and Prevention

Regional disease control centers usually provide health examination services for chronic and severe mental illnesses to groups such as enterprise employees, community residents, school students, and kindergarten children, and carry out targeted chronic disease health education, publicity, and guidance work. However, many disease control centers currently lack the construction of health examination information management systems, and the entry of examination results and disease intervention management for different examination personnel are not in place.

Firstly, the construction of information management systems for disease control centers in underdeveloped areas and grassroots areas lags behind. Due to a lack of sufficient financial and technical support, the centers have not developed an internal public health examination management service system, nor have they utilized ERP (Enterprise Resource Planning) management service software for registration, data collection, statistical analysis of examination results, data storage and sharing. The second issue is that the information service modules related to psychological counseling, health education, and publicity guidance are insufficient, making it difficult to provide support for CDC staff to participate in chronic disease intervention and psychological counseling.

3.3 Inadequate construction of the management team for health examinations at the Centers for Disease Control and Prevention

Centers for Disease Control and Prevention at all levels have medical personnel such as doctors and laboratory technicians. Each medical personnel is responsible for registering examiners, conducting physical examination and testing, and collecting and inputting physical examination results during physical examinations. This means that some medical personnel are not only responsible for medical examination and testing work, but also need to integrate and input different types of physical examination results into backend servers, which greatly increases the work pressure of medical personnel. However, the management team construction in some disease control centers' health examinations is not in place, there is a lack of dedicated service personnel responsible for information management, and a systematic health examination training mechanism has not been established, which largely leads to low execution efficiency and service quality of health examination work.

4. KEY TECHNOLOGIES FOR PUBLIC MANAGEMENT OF HEALTH EXAMINATION IN CENTERS FOR DISEASE CONTROL AND PREVENTION

4.1 C/S software development architecture technology

The software development architecture of the client/server (C/S) model is based on Delphi 7.0 tools, SQL Server 2005 databases, and other software and hardware, establishing a multi-layer network structure that includes client application programs and database server programs. [2] The client is a front-end control program that interacts with users and is responsible for sending data access, data verification, data management, and other requests to the server. The backend server is responsible for accepting client requests, running a database management system for information query, data processing, and management, and submitting the processed network data to the client, achieving a good integration of the "data request task response" mode.

4.2 SQL Server 2005 Relational Database Technology

SQL Server 2005, as a relational database management model launched by Microsoft, is an end-to-end, integrated data processing and storage platform. Create a SQL Server 2005 database management platform with the support of SQL Server, set up database mirroring, online analytical processing (OLAP) and other components, define the recorded network data information as cluster index data, and use database mirroring by management personnel for data distribution and ineffective data transfer. Use online analytical processing components for online data retrieval, data recovery, and advanced processing analysis, and integrate it into a web-based data information report, Provide support for subsequent data mining, extraction, and loading (ETL).

4.3 Big Data Mining Technology

The cloud computing data mining mode based on web clients utilizes Sqoop data connector, HDFS distributed file tool, Flume data collection tool, and data warehouse to complete network data mining, cleaning, integration, transformation, and evaluation operations. [3] After the user logs in to the backend server through control protocols such as account and password, they use SQL statements to transfer the input health examination data to a relational database and cache it in the HDFS distributed file system. They choose distributed parallel computing methods such as classification decision tree algorithm, association rule mining algorithm, K-means algorithm, etc. to collect, clean, integrate, format convert, copy, and store different types of network data, Evaluate the value of the excavated data information and encrypt it for transmission, ensuring the accuracy and security of data mining and management.

5. INFORMATION MANAGEMENT SYSTEM ARCHITECTURE FOR HEALTH EXAMINATION IN CENTERS FOR DISEASE CONTROL AND PREVENTION

A health examination information management system based on big data mining technology and software development technology usually has sub modules covering registration of examination personnel, examination photography, project inspection and testing, and entry of examination and review results. Different sub modules are used for the collection and integration of information for different projects[4].

In the registration module for medical examination personnel, RFID reading card, magnetic card recognition, and QR code scanning technology are used to identify and record the name, gender, age, medical examination items, contact information, and other information of the medical examination personnel; The physical examination photography module is mainly responsible for inputting on-site photos and associating medical examination personnel information; The physical examination project inspection and testing module mainly sets up detection service windows for blood glucose, blood pressure, electrocardiogram, chest X-ray, B-ultrasound, hematuria routine, fecal occult blood test, blood biochemical examination set, tumor markers, etc., used to display and record the inspection cost standards and additional cost information, and automatically calculate the total cost; The physical examination and reexamination result input module is used by management personnel to input the examination results, relevant medical history, and other information of the examination personnel into the backend server through OCR scanning recognition technology and data mining analysis technology after completing different items of inspection and testing. When the examination results are abnormal, the reexamination function is also supported. After the reexamination, the final results are entered into the backend server and cloud service platform.

6. RESEARCH ON OPTIMIZATION AND INNOVATIVE STRATEGIES FOR PUBLIC MANAGEMENT OF HEALTH EXAMINATION IN 5 CENTERS FOR DISEASE CONTROL AND PREVENTION

6.1 Develop a scientific and systematic public management system for health examinations

The standardized development of the health examination work of the Centers for Disease Control and Prevention cannot be separated from the support of scientific health examination management systems. According to the provisions of the "Regulations on the Management of Medical Institutions (Revised in 2022)", disease control centers in various regions should develop a scientific and systematic management mechanism for physical examination projects and a staff access system tailored to the needs of different groups. It is required that staff participating in the experience must obtain a practicing physician qualification certificate and only after professional training can one take up the job. According to the health examination process, clarify the examination standards, examination items, and examination cycle, establish a record management system for pre examination preparation, examination process, and post examination results, as well as a service mechanism for health examination publicity and psychological counseling education, to improve the management level of the health examination work of the Centers for Disease Control and Prevention.

6.2 Optimize management service process based on health examination information system

According to the functional modules set by the network management system, such as registration of physical examination personnel, physical examination photography, item inspection and testing, and entry of physical examination and review results, led by the backend management personnel of the Center for Disease Control and Prevention, the collection, mining, cleaning, integration, format conversion, evaluation and analysis of health examination information are classified and completed. The physical examination results are entered into the backend server and cloud service platform, The user department uses the health examination client app developed by the Center for Disease Control and Prevention to query and share their own health examination and review information. [5] At the same time, the CDC health examination information management system based on the C/S model also has functional service modules for health examination promotion and guidance, psychological consultation, and health education. Medical staff such as CDC doctors and laboratory technicians jointly participate, and regularly carry out online and offline health examination project science popularization, psychological consultation analysis, and health examination education activities.

6.3 Pay attention to the construction and service of the management team for health examinations in the Centers for Disease Control and Prevention

To meet the physical examination needs of enterprise employees, community residents, school students, kindergarten children, and other groups, establish and improve a talent training mechanism for the physical examination management of the Centers for Disease Control and Prevention, strengthen the education of the "customer centered" service concept, guide management team members to develop personalized physical examination plans and optimize the service process of physical examination calling and payment based on the age, occupation, health status, and other characteristics of different examinees, Ensure timely and accurate feedback of medical examination results to the subjects and reduce user waiting time. At the same time, medical personnel such as doctors and laboratory technicians participate in the experience review, prioritizing the provision of physical examination services for the elderly, and providing dedicated accompanying services for patients with mobility difficulties. They help patients understand and analyze their own health status, and provide professional disease care and health guidance services to ensure the professional service quality of health examination guidance, publicity and education at the Centers for Disease Control and Prevention.

7. EPILOGUE

In the era of big data, the supervision and management of the health examination work of the Centers for Disease Control and Prevention need to establish a sound health examination management system, build a software and hardware service platform for the information management of the examination center, and involve doctors, inspectors, public management and other entities in the design and control of the examination process to ensure the accuracy and reliability of the examination results. Therefore, based on the health examination needs of different age groups and special populations, a scientific and systematic medical examination service system for

the Centers for Disease Control and Prevention is established. Advanced medical examination equipment is introduced for project inspection and testing, and the health examination information management system is used to complete data statistics and analysis before and after the examination. The results of the examination and payment are entered into the backend server and cloud service platform, improving the data utilization rate of the Centers for Disease Control and Prevention's health examination Quality of public management services.

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