

Design of Intelligent Pediatric Nursing Management Platform from the Perspective of Big Data

Hongxia Zhao, Junjun Zhang, Zhicheng Zhu, Jiangtao Du,

Yahong Xiao*

People's Hospital of Weiyuan County Dingxi, China

*Corresponding author e-mail: 2621117062@qq.com

Abstract. With the popularization of network technology, the management mode of pediatric nurses has also changed. Because the traditional pediatric nursing work is restricted by the traditional mode, it not only affects the service quality of children's outpatient departments and wards, but also has a negative impact on the psychological and physical health of patients. Therefore, the development of an intelligent pediatric nursing management platform is a prerequisite for the realization of the whole process management of children. Pediatric nursing management is a comprehensive service platform, which is fundamental and public welfare, and is of great significance to achieve high-quality nursing services. Based on relevant experience, this paper designed and implemented an intelligent pediatric nursing management platform, which has certain practical value and can provide decision-making basis for clinical work.

Keywords: Big data; Intelligent platform; Pediatric nursing; Management platform; System design.

1. Introduction

With the rapid development of social economy, the demand of children's medical care market in China is growing rapidly, which puts forward higher requirements for pediatric nursing. Therefore, it is an important means to improve the quality of nursing work and reduce medical risks by scientifically and systematically building an intelligent pediatric nursing management platform to promote the whole process nursing management of children. This paper has developed an intelligent pediatric nursing management platform based on the relevant experience at home and abroad. Through information exchange between the nurse side and the patient side and intelligent data collection on the platform side, the management of the diagnosis and treatment information, drug use, discharge information and other aspects of children has been achieved, further standardizing the clinical nursing behavior and quality, and improving the level and ability of pediatric nursing services. In order to achieve the continuous optimization of the entire child health service system.

Nursing management refers to the process of monitoring, evaluating and analyzing the patient's condition, diet, sleep, life, mental state and other information to improve the quality of nursing and optimize nursing resources. Yanan Cao realized the modularization of pediatric nursing information system by applying prototype method and modular design ideas. The paediatric nursing work has been optimized, which has greatly improved the work efficiency of medical workers, the loss of medical records, errors and management problems [1]. Pan Li's experimental analysis shows that the application of teaching resource library in multimedia teaching of community nursing can effectively improve students' interest in learning and optimize the teaching effect [2]. Kirk D aims to develop and evaluate the classification of drug-related patient safety events related to HIT, and verify it with a set of events involving pediatric patients [3]. However, the application of big data in pediatric nursing management needs further promotion and research.

As most pediatric patients are in the monitoring mode, it is difficult to manage them, so most of them are managed manually. However, with the increase in the number of pediatric patients, higher requirements have been put forward for the allocation of human resources for nursing staff. By building an intelligent pediatric nursing management platform, we can create a better working environment and mode for nurses, improve the service quality and satisfaction of the hospital,

reduce medical disputes, reduce medical costs, improve the competitiveness of the hospital, and improve the patient's medical experience.

2. Research on the design of intelligent pediatric nursing management platform

2.1 Platform overview

Based on children's clinical characteristics and nursing needs, the pediatric nursing management platform mainly includes: data collection, information management, quality control, etc. The data acquisition system adopts the architecture of "hospital nursing unit ward" and three-level structure. The data is stored on the server and can be downloaded by each department in the maintenance center. The platform mainly includes two parts: data acquisition system; Analysis management system [4-5].

2.2 Large capacity distributed storage technology

Large capacity distributed storage is a distributed database technology, which can store and access data, and interact with data during the access process. This technology uses data cache and partition storage in distributed database to realize the separation of resources to ensure the stability of the system. This technology can achieve uninterrupted access to the database in data processing, adapt to massive storage space requirements, and support any number of server programs. Based on this technical feature and distributed database architecture, the application system can store and access large amounts of data and maintain its integrity [6-7]. The life cycle monitoring of children continuously accumulates and analyzes the data of each stage through real-time monitoring of their health status and clinical work. Through the systematic monitoring of children's changes in different nursing stages and health status, we can timely find situations that are not conducive to children's treatment needs or have potential safety hazards. The patient information system forms a nursing service evaluation system by integrating and analyzing various basic data of patients to determine whether there are unreasonable phenomena in medical institutions. To achieve the goals of communication, coordination and cooperation between doctors and patients in daily work and improve management efficiency, so as to provide patients with professional, reliable and personalized diagnosis and treatment services. With the help of Internet and Internet of Things technology, the nurse information system can realize patient identity verification, and provide support for patients in the follow-up work process such as status monitoring and treatment according to the data collected by the system, so as to ensure the legitimate rights and interests of patients [8-9].

2.3 DAS technology

DAS is a complex mathematical model, which requires the cooperation of algorithm experts and databases. The DAS system based on algorithm data is used to mine data using artificial intelligence algorithm technology, and then relevant data is processed [10]. DAS is widely used in the daily work of hospital clinical staff. Through model analysis, we can combine some key indicators with the clinical situation to obtain more comprehensive, more detailed and meaningful clinical health information. In this paper, we use data analysis technology based on computer data processing ability to give strong support to the challenges faced by hospital medical staff in their daily work. The DAS technology was applied to the nursing management of child care patients, and the results of DAS analysis made the medical care process more standardized and effective. The DAS system based on data-driven algorithm can be used to analyze the general health indicators, clinical health and other factors of pediatric patients. For example, observe body mass index and sleep quality; Compare with hospitalization time and admission time; Check the correlation between heart rate, respiratory rate, blood oxygen saturation, body mass index and hospital stay. The disease situation and severity can also be compared and evaluated [11-12]. For example, through the comparison of DAS results, it was found that the mortality and hospitalization time of viral pneumonia increased

significantly and the severity of the disease increased; In addition, it can also be judged that nursing is not in place and the workload of nursing staff increases. So as to guide and adjust the problems existing in the daily care and medical care of child care through the platform.

2.4 Platform Application Strategy

The application strategy mainly includes: establishing a comprehensive report based on the data collection results. Combining the data collection results with the comprehensive report, according to the analysis of the nursing data monitoring results and the comprehensive report of each department, through the analysis of the relationship between various factors, we comprehensively calculated the key nursing objects of the department, and listed the key nursing objects as the key monitoring objects, effectively improving the quality of pediatric nursing work; Strengthen the training of nursing staff. Professional training should be used to strengthen nurses' learning of medical nursing knowledge and professional knowledge, improve nurses' professional level, and achieve both nursing quality and efficiency; Improve the operation and maintenance management ability of nursing information system. Manage and maintain nursing information through the system monitoring data platform, timely feed back abnormal information, provide early warning information for medical staff, and provide scientific basis for relevant medical research; Give play to the role of high-quality nursing. Use various information means to strengthen the publicity of high-quality nursing services, improve the awareness of medical staff on the importance of high-quality nursing services, and improve the satisfaction and security of children and their families.

3. Experimental design of intelligent pediatric nursing management platform

With the continuous improvement of the information system, the university hospital has built a clinical data center with complete functions and rich contents. Due to the large number of data, wide distribution, some data are still unorganized, data specifications are not unified, data quality is low, etc., resulting in a long time of data collection and data security can not be guaranteed. At the same time, there is an independent relationship between disciplines, which leads to the difficulty of data reuse. From the current situation, the current clinical data collection is still conducted in a traditional way, and has not formed an effective use.

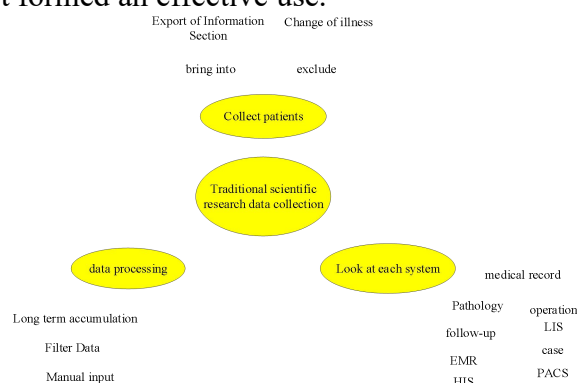


Fig. 1 Traditional scientific research data collection

Spring Cloud provides configuration management for distributed systems. In a distributed environment, it implements remote call and business management of RESTFUL based on the microservice architecture. The platform mainly controls the registration, deployment, operation, audit and other key links of the service, and manages and monitors the monitoring service, log analysis platform ELK, configuration service, etc. of the enterprise platform. The access layer provides compatibility for PC and mobile device access. The Web layer uses VUE technology, and VUE is a set of user interfaces developed step by step. Among them, the special operation platform

is the daily operation and maintenance of the platform. Specialized disease management, providing forms and form configuration and management for specific diseases.

Assuming that the original database has TYM data volume and N data transactions, the time to obtain a candidate item set is: time of connection step+time of pruning step+time of calculating support level. Then, we can get the time complexity of the conventional Apriori algorithm:

$$P(TYM) + \sum_{r \geq 2} (P(C_r * C_r) + P(C_r * C_{r+1}) + P(N * C_{r+1})) \quad (1)$$

P_Apriori_BP algorithm assumes that there are m nodes, then P_Apriori_ The time complexity of BP algorithm is:

$$P(TYM) + \sum_{r \geq 2} (P(C_r * C_r) + P(C_r * C_{r+1}) + P(n * C_{r+1})) / m \quad (2)$$

From this, we can see that the transaction database is partitioned using the idea of segmentation, and the algorithm is improved by combining it with the MapReduce model, so as to achieve the comparison of multiple instances, accelerate the pruning of data sets. At the same time, the design idea of parallel processing is adopted to achieve the parallel operation between multiple nodes, so as to overcome the bottleneck problem of the application program, so that P_Apriori_BP algorithm has obvious advantages.

4. Analysis of intelligent pediatric nursing management platform

The platform has the ability to acquire, model, calculate and store clinical data. With the combination of these data and knowledge, the clinical trial was finally supported.

The construction of data specification starts from the data integrity and specification requirements, establishes standardized and complete data, and ensures the accuracy, integrity and consistency of data quality. Structuring of medical records: Outpatient and resident doctor workstations have been transformed to realize the structure of medical records. Traditional medical records have been organized into hundreds of data units. Scientific research projects have been structured through standardized options. Structured report: RIS, LIS, endoscopy, ultrasound, pathology system and other systems have been updated to input structured information when submitting reports, and a standardized organization template has been established to ensure the standardization and integrity of the data collection process.

When the data center is faced with a large number of consolidated data, the efficiency of finding and locating research data is low if the traditional associated database search method is used. Therefore, the new data center uses Elastic search, the most popular distributed search technology at present, to solve the problem of slow query speed of key data. Elasticsearch can realize and integrate many different searches, such as structured, unstructured, geographic location, and measurement. It can be used for full-text search, structured search, and real-time analysis. It is currently the most popular enterprise search engine.

The research platform is based on Elastic search, which is used to conduct structural modeling of clinical data, including patient's basic information, outpatient medical information, inpatient medical information, test report, etc. Figure 2 shows the data structure of the data center.

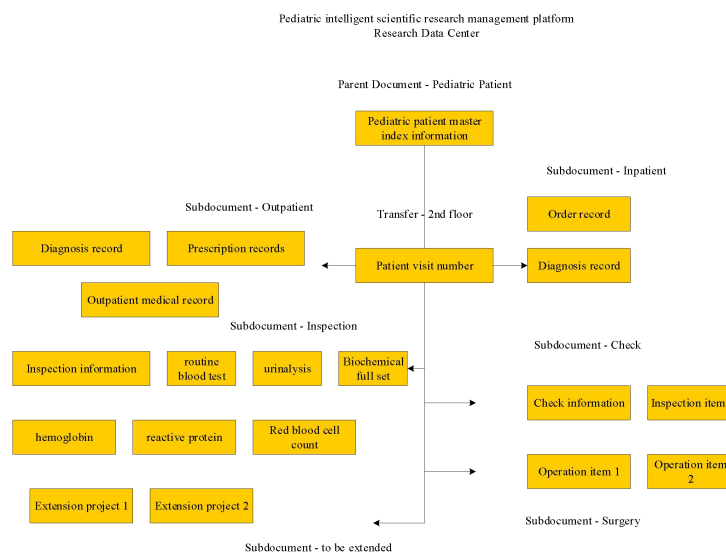


Fig. 2 Pediatric Clinical Data Center

ETL is a data acquisition tool. A large amount of patient data, outpatient diagnosis and treatment information and other data from HIS/EMR/integrated platform are converted, cleaned and stored in MySQL database.

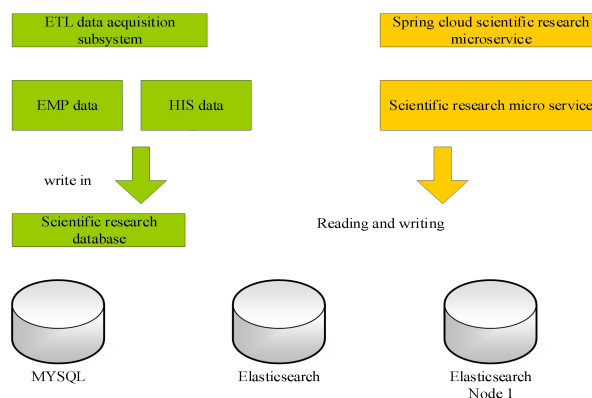


Fig. 3 Data acquisition and processing flow

5. Conclusions

In the information age, data has become an important factor determining the development of hospitals. With the continuous updating and development of modern nursing concepts and management models, it has become an inevitable choice for nursing management departments to apply big data to clinical nurse assisted decision-making. Therefore, this paper establishes a clinical data center, applies the distributed search and analysis engine technology of Elastic search, and further improves the data indicators according to the professional knowledge of clinicians, so as to lay a foundation for clinical research project management. At present, the analysis and application of the platform for single disease data need to be further improved, such as: post processing of historical data, intelligent data mining and analysis, efficiency of data collection, and improvement of data collection quality. In the future, the platform will be continuously improved to make the scientific management platform more intelligent.

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