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Original Article

Nasal mucosal care before and after nasal endoscopic surgery based on computational information system resource sharing technology

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Abstract: This study presents an in-depth analysis on a machine-designed computational web-based information system, which was used to conduct nasal mucosal care before and after nasal endoscopic surgery for chronic sinusitis. The system was developed and implemented using the mainstream B/S structure model with a Java development framework and MySQL database. Sinus irrigation solution has been shown to be effective for postoperative flushing after nasal endoscopy, by eliminating mucosal edema and promoting mucosal epithelialization at the operative cavity, and it is currently a desirable method that deserves promotion. By comparing the time required for surgical cavity cleaning, the rinsing solution was shown to be key of the physical flushing effect in the initial period after nasal endoscopy. It could remove blood cemented and surgical cavity surface cemented skin and secretions. In addition, the sinus irrigation solution can accelerate the mucosal epithelialization of the operative cavity more effectively than compounded saline. It could effectively eliminate mucosal edema, restore its protective and defensive functions, and help local blood circulation, secretion absorption, mucosal growth, mucosal regeneration and repair, and mucus cilia removal.

Keywords: Nursing information system, chronic sinusitis, nasal endoscopic surgery, nasal mucosal care

Introduction

Health is the common pursuit of human beings and basis for the progress of human civilization; however, diseases are unavoidable. Everyone ages, sickens and dies. With the rapid development of computer technology, humans have entered the era of artificial intelligence and big data [1]. The progress of information technology has significantly changed our work and lifestyle. Information technology is becoming increasingly important. Similarly, the hospital informatization mode is also developing rapidly, and modern hospitals are dependent on information technology construction. In particular, hospitals propose that more needs can be managed with information management systems, and doctors require a system to effectively manage their patients so that they have more time for patient's conditions and treatments. With the rapid development of computer technology, the application of information technology has becoming more convenient. Therefore, establishing a hospital information system (HIS) that can satisfy the needs of both hospitals and physicians is particularly important [2].

In the medical field, the various information management systems must integrate computer, ultrasound detection, nuclear magnetic and scanning imaging technology so that patients can have more advanced medical services. Although the technological level of diagnosis and treatment is increasing, application of more advanced management systems is in demand [3]. Simultaneously, HISs should be used to record detailed information about hospital services to improve efficiency and provide more convenience to the public. In addition, smart HISs can determine information about a patient's previous case data, including their medication and treatment history with the social security card provided during their visit.

Intelligent HISs for procedures such as reimbursement can improve the diagnosis and treatment efficiency and accelerate patient care. After years of effort in the field of information technology in the Chinese healthcare sector, this can be said to be extremely beneficial [4]. To date, most public medium and large hospitals in China have implemented electronic and informational HISs for aspects such as patient counselling, medication management and some daily tasks.

Fueled by Internet technology, the medical field has undergone tremendous changes [5]. Online medical communities differ from traditional hospital-centered medical and health services and have an important positive impact on users' self-health management [6]. Along with the development of online healthcare, related research has continuously emerged. Online medical community (OMC) refers to an Internet platform that connects or aggregates medical professionals, patients and their families, caregivers, and other supporters with similar interests, where people can share or access information and seek support [7]. Casale proposed that OMCs can provide support for patients with chronic diseases to perform daily self-care with effective offline support from their physicians and can help improve the doctor-patient relationship [8]. Information support aims to help patients maximize their access to a healthier state, and emotional support aims to make people feel welcome, cared for, and valued in OMCs [9].

The active ingredients in sinusitis oral liquid can clear heat, dispel wind and dampness, open the nasal passages and have a strong anti-allergic effect. Sinusitis oral liquid can promote edema, mucous membrane inflammation of the nose and sinuses, and diseased tissue normalization. It is used after nasal endoscopic surgery for sinusitis and has the same effect as hormones. Sinusitis is observed after medication changes, primarily because sinusitis oral solution has an antibacterial effect. In addition, the long-term application of prednisone can reduce the anti-infective effect and aggravates the infection risk.

Li et al. audited data analysis applications to build a summary of classification rules. In addition, Fadel Adib designed a class of intrusion detection engines that differ from conventional ones based on anomalous behaviors, such as SoCs in the Internet of Things (IoT). This proposal integrates machine learning with anomaly detection so that the field-programmable gate array (FPGA) within the hardware can provide energy efficiency [10]. This was the first work that implemented a specific energy consumption determination for each classifier and that can be used to extract network packets, which can be successfully implemented in both hardware and software. Hwang explored a new class of stream algorithms in conjunction with the k-means concept, which focuses on the application of broken change data center points and an accurate illegal intrusion detection, which significantly optimizes the efficiency and quality of intrusion detection compared with conventional detection methods [11]. However, the algorithm does not analyze the negative impact of time on the data weights, and at this stage, no significant gap exists between the data and actual percentage of historical information on detection activities, which causes the intrusion detection results to be more biased than some outdated information [12]. Moreover, because of the influence of conventional processing methods, this algorithm can obtain only detection data within a specific period, and cannot obtain the results required at an exact time, which leads to a relatively poor reliability and excessive generalization [13].

The patient compliance is influenced by three elements: patients' behavioral attitudes, subjective awareness and perceived behavioral control. Motivational interviewing (MI) is a patient-centered interviewing method that focuses on patients' psychodynamic processes to change the patients' behavioral attitudes, which then improves patient compliance, and ultimately improves patients' mental health and quality of life. MI has been widely used for the change and prevention of undesirable behaviors, as well as the promotion of problem-specific health behaviors and other health-related behaviors [14]. Many studies have confirmed that MI significantly improves patient compliance in asthma and hemodialysis treatments. However, no studies have reported the use of MI in patients recovering from nasal endoscopy after CRS. Therefore, this study constructed an MI-based continuation care program, in which face-to-face communication allowed the interviewer to take initiative to discover and uncover

the postoperative challenges in patients, while informing patients of the recovery process of the postoperative cavity after nasal endoscopy and importance of follow-up visits so that patients could discuss solutions to their problems with the interviewers. This approach aims to fully mobilize patients' subjective initiative, improve patients' treatment compliance and self-care ability, and improve patients' mental health and survival quality.

In the context of the "Internet+" era, considerable attention has been paid to the information construction of senior care institutions and active exploration of the innovative mode of "Internet+" senior care [15]. To solve the problems of interconnection and data sharing, data interfaces must be developed relying on the original software manufacturers [16]. However, owing to the shortcomings of data collection and fusion technology, guaranteeing the reusability of interfaces is difficult, leading to incalculable costs in time, effort and money, as well as a possible deadlock caused by new system development teams, source code losses and other reasons [6]. Currently medical institutions continue prioritizing the exploration of system data architecture arrangements, technical platform upgrades, and unstructured data collection, cleaning and transformation, etc. Without professional information technology personnel in hospitals, rationalizing the data application path of business systems is impossible by simply relying on system developers, and realizing the practical clinical application value and guidance value of data is also difficult. Therefore, achieving the interoperability of medical applications, promoting the industrialization of medical big data, and integrating data collection and interfaces common bet ween application systems have become the most urgent tasks of interoperability standardization. The information construction direction of major medical institutions has begun to gradually transform from focusing on satisfying the needs of a single clinically limited application, or certain function, to the integration construction and integration of information resources, and integration platform construction. The public has begun to notice the construction of integrated platforms, and medical institutions have re-planned to support their development needs. To construct a good integration platform, we must rely on the pivotal function of core middleware. Therefore, we took the initiative in proposing the concept of a medical service bus and conducted independent research to address the demand for interoperable and standardized integration work in the medical information industry.

Materials and methods

Analysis of nasal mucosa care before and after nasal endoscopic surgery for chronic sinusitis in a computerized-network care information system

Design of a computerized web-based information system for nasal mucosal care before and after nasal endoscopic surgery for chronic sinusitis: Requirement analysis is a main step in the development of software systems. Detailed and accurate requirements are prerequisites for the foundation of the design and development of a successful system [17]. Requirement analysis requires full communication between staff and users, close cooperation of their respective fields, and the accurate transmission of user needs. The staff must understand the expertise of users' industry fields and documents required to determine the objectives of software system. The main personnel of the HIS include system administrators, doctors, nurses, registration and charging clerks, pharmacy administrators, and warehouse administrators. According to the specific needs of a hospital system, the requirements for hospital outpatient registration, outpatient physician workstations, nurse workstations, pharmacies, drug stores, inpatient physicians and outpatient charging must be analyzed in detail [18]. In addition, system hardware and software requirement and feasibility analyses were conducted to make the system practical and user-friendly.

Minimizing the system development and maintenance cost during the design process is necessary. External hardware devices are sufficient for supporting the security and proper system operation. Blindly pursuing high configurations is unfeasible, and using high-end configuration equipment may be expensive for future maintenance. When developing the system, the principles of security and openness must be considered. While implementing the system, paying attention to the possibility of expanding the system's functionality in the future is important. If there is a change in vil-

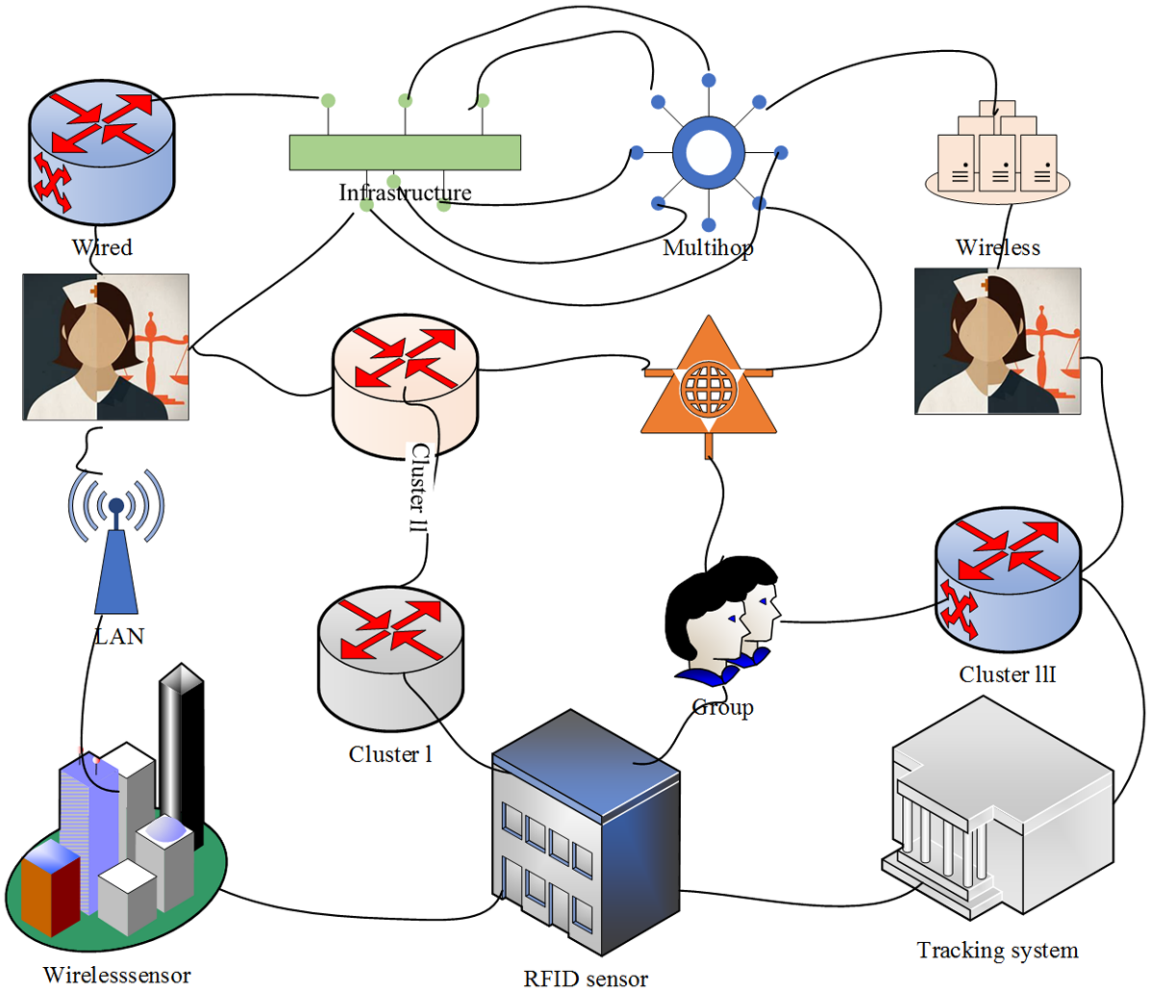

Figure 1. Framework of the nursing information computer network system.

lage health clinic operations, the system should be able to extend its functionality based on the original standards to ensure long-term system use. In summary, establishing a rural HIS improves the management of rural clinics, reduces operating costs, and improves service levels, as shown in **Figure 1**.

Studies investigating the etiology of patients with chronic sinusitis have determined that approximately 80% of patients exhibit allergic factors to varying degrees. Hence, postoperative follow-ups and comprehensive treatments are the greatest factors influencing cure rates, based on a successful surgery. The role of allergic factors in the recurrence and prognosis of chronic sinusitis and nasal polyps and strengthening of postoperative immune regulation are important issues for rhinologists.

The design and development of the information system outline are crucial, and this section focuses on the design method principles, functional modules, and overall architecture for a detailed analysis (**Figure 2**). As discussed in the previous section, the information platform of a senior living institution can function from multiple departments to achieve information network sharing across the entire business under a perfect information service system, such as across the reception, personnel, finance, resource management and coordination departments. Therefore, our senior care institutions must install a wristband system as soon as possible [19]. Only by employing a wristband system and establishing a brand-new network supervision system can we truly realize the daily life of the elderly, improve the medical environment for the elderly, and provide them a

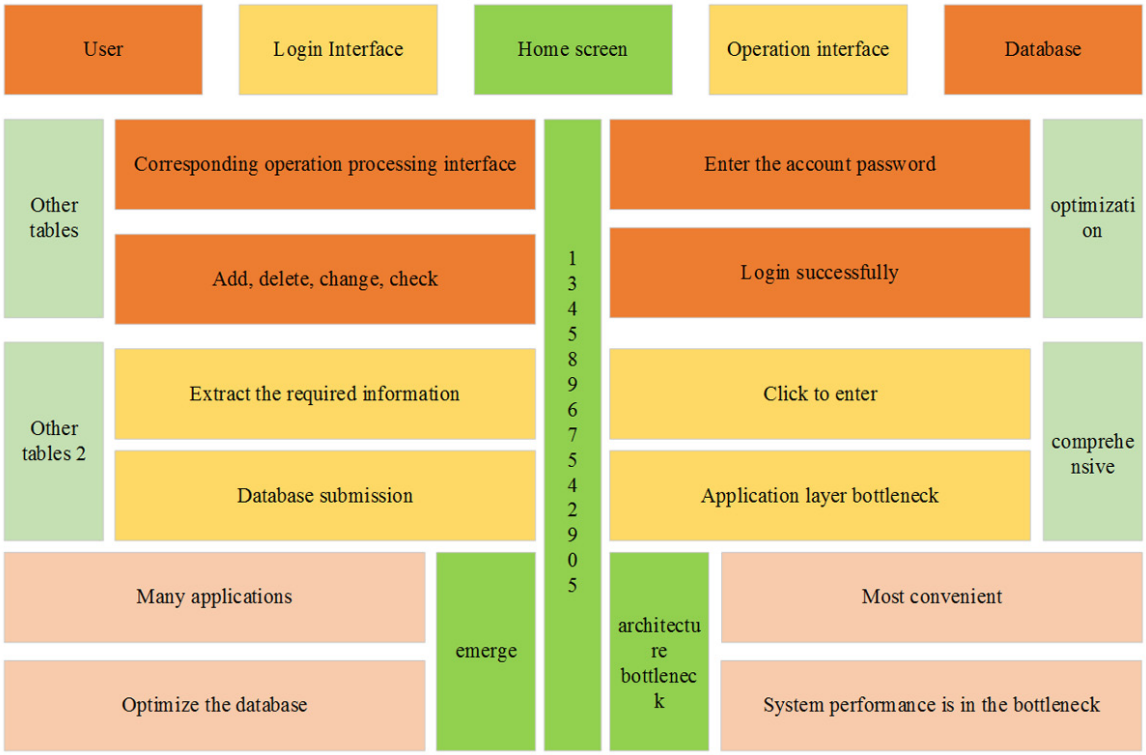

Figure 2. Sequence diagram of system operation.

sense of security. In addition, the medical staff of the nursing home must frequently maintain the information of the elderly residents, care about their status, and report relevant information to the decision-making level.

In addition, family members on the external system can log in to the nursing home service system to understand the daily life and living conditions of the elderly in real time, as well as communicate via video call and provide suggestions to the nursing home. In addition, more advanced system maintenance staff can operate remotely, thereby facilitating integrations of and adjustments to actual situations and create better plans. However, all these functions must be based on strong computer network and information sharing services to create a truly reliable, convenient, efficient and open service model.

To tune the system, the goal of system tuning must first be determined. If the application has satisfied the demand, then system tuning is unnecessary. This is because it is impossible to determine whether the system performance, operability and other adjustment indicators have been affected or whether tuning causes other problems in the application after conducting a system process. Thus, determining the goal of tuning is crucial. Web performance is the golden rule: only 10%-20% of the end-user response time is spent downloading HTML documents, and the remaining 80%-90% is spent downloading page components. When a user obtains a response in less than 2 s, the system feels particularly responsive. When the user obtains a response within 2-5 s, the system is responsive. When the user obtains a response within 5-8 s, the system response is slow but acceptable. During the postoperative rinsing period, patients attempt to adjust the rinse solution to the appropriate temperature and control the pressure of the rinse device. During the treatment period, no drug-related allergy or general discomfort was detected in either group. The patients' blood and urine routine and liver and kidney function tests were normal.

In many applications, optimizing the database is often the most direct, convenient and significant solution. However, databases are not always the bottleneck for system performance, also in application layer, WEB layer and even architecture. Therefore, while database optimi-

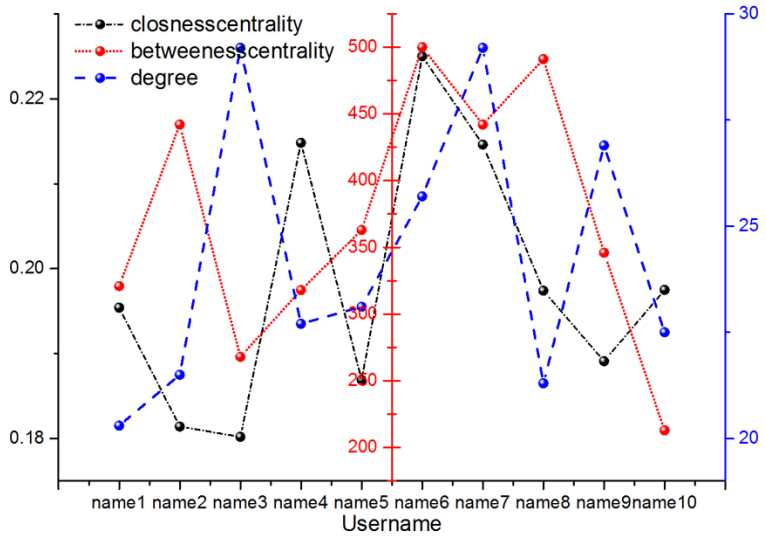

Figure 3. Example of data results.

zation is important, system optimization is often understood to be database optimization, which is uncomprehensive. Specific database optimization principles include: read-write separation, business data separation, reducing large fields, rarely used isolated tables, and on-demand queries. In addition, a large list of queries can use page storing procedures to achieve optimization; database caches, views, and temporary tables to maximize the optimization system; and optimized and stored procedures and functions to remove redundant table fields and avoid joint queries, thereby establishing correct primary and foreign keys and indices.

Experimental design for the validation of nursing system: A mathematical model is an abstract description of the nature of a problem using systematic symbols, numbers and mathematical expressions. Mathematical modeling can be considered the process of converting the definition and understanding of a problem into a mathematical model (including function expressions, equation expressions, etc.) that helps humans obtain an accurate understanding of a problem's nature. Mathematical models include two major components: model conditions (definition conditions, assumption conditions, constraints, etc.) and model variables (decision variables, environment variables, objective functions, etc.). Mathematical modeling is a creative endeavor, and no single correct model exists for all the problems [20]. Therefore, mathematical modeling is an abstract description of a real problem that can help this study to transform the influence mechanism framework of key nodes of the online healthcare community information interaction network into an understandable, user-friendly, and heuristic model representation.

Generally, modelling refers to a specific philosophical attitude of humans towards scientific knowledge, that is, a set of rules and evaluation criteria concerning various practical activities in the human understanding of the real world. Seeking the accuracy, certainty and falsifiability of scientific knowledge can be said to be the main goal of empirical research. This requires researchers to use mathematical logic as a tool for clear analyses of the theoretical structure of knowledge [21]. Investing in empirical studies that analyze the mechanism model of the influence of key nodes in an online medical community information interaction network is necessary to prove the ground ability and practical application value of the proposed theoretical framework and mechanism model. Therefore, this study analyzed the actual influence of specific key nodes based on web crawlers and Gephi, a social network analysis tool, and explored the constraints on their influence in terms of directness, indirectness and bridging. Three constraint situations emerged in the empirical study: direct influence that is primarily constrained by the information load capacity of other nodes, indirect influence that is primarily constrained by the indirect information interaction capacity of key nodes, and bridging influence that is jointly constrained by the bridging information interaction capacity of key nodes and strength of information interaction relationship between nodes on the shortest path. This study purposefully proposed solutions to enhance the influence according to these situations. **Figure 3** shows the solution for enhancing the influence.

As the central nerve of hospital information integration, the medical service bus primarily serves in the interconnection and standardization application so that each independent system can correctly call the interfaces opened or

proxied by other systems through the service bus. It realizes basic operations, such as the opening, applying and approving of service interfaces, viewing call logs and statistics of call information, maintaining API templates and module configuration management, etc. Taking the above pathology business system as an example, to solve the standardized transformation of the pathology business-related business flow, the corresponding pre-data information parameters and subsequent business system consumption function parameters must be formulated against the business flow and to sort and analyze the interaction interface between the pathology business and medical service bus according to the transformation of the previous pathology business process and development of the pathology business flow after the transformation. The ciliary movement direction of the nasal mucosa is from the front. The movement direction of the mucosal cilia in the sinus cavity is from the circumference of the sinus cavity towards the natural sinus opening. This directional and rhythmic oscillation of the cilia removes microorganisms, allergens and other irritants from the nasal cavity. The cleansing action of the mucous ciliary system of the nasal mucosa is an important mechanical protective function of the human upper respiratory tract. Bacteria and other harmful substances are removed from the body by transporting cilia that inhaled dust.

Finally, this study designed the influence function of key nodes. The influence of the key nodes comprises three components: Directness (i), Indirectness (i), and Bridge (i), and the corresponding results were obtained by comparing the ideal influence of the key node with the information loading capacity of other nodes.

$$Directness(i) = \frac{1}{\theta_1(i)} \sum_{j=1}^{\theta_1(i)} \max\{d(ij)\beta_d(ij), I(j)\} \quad (1)$$

$$Indirectness(i) = \frac{1}{\theta_1(i)} \sum_{j=1}^{\theta_1(i)} \max\{s(ij) \cdot \beta_d(ij), I(j)\} \quad (2)$$

$$Bridge(i) = \frac{1}{z-1} \sum_{j=1}^{z-1} \sum_{j=1}^{\theta_1(i)} \max\{b(ij) \cdot \beta_d(ij), I(j)\} \quad (3)$$

In this study, these three components of influence were assigned weights of 0.28, 0.55 and 0.17, respectively. Therefore, the influence function of key nodes in the online medical community information interaction relationship network is as follows.

$$Influence(i) = 0.25Directness(i) + 0.28Indirectness(i) + 0.47Indirectness(i) \quad (4)$$

The model can effectively reveal the influence mechanism of key nodes in an online medical community information interaction relationship network and fully explain the intrinsic relationship between the information interaction ability, information interaction relationship strength, information load capacity, and key node influence.

$$F_{k+1} = \{f^o + O \mid f^o \in F_{k+1}^O\} \quad (5)$$

To avoid duplicate joins, arranging the elements in the itemset in a certain order before joining remains necessary.

$$C_k = apriori\_gen(F_{k-1})^2 \quad (6)$$

This test focuses on the functional and performance testing of the above development content, emphasizing the core functional modules of outpatient physicians, outpatient billing and inpatient nurses, which have a high business volume, to check and evaluate the degree of functional perfection in the simulated test environment, the ability to manage the system load, the responsiveness and throughput capacity of the system under a large number of user connections, maximum data capacity, and maximum number of users that the system can support.

$$\forall s \subset c \cup s \quad (7)$$

$$f_i \in F_{k-1} do \quad (8)$$

The performance test and real operating environments may slightly differ owing to external factors, data volume differences, network environments and hardware configurations. The performance of the test server environment is much lower than that in the actual environment. The system uses a standard B/S structure, and the client accesses the application system through a browser; the browser primarily uses IE10. The performance test of the HIS was conducted in the usual stress test mode by gradually increasing the pressure on the sys-

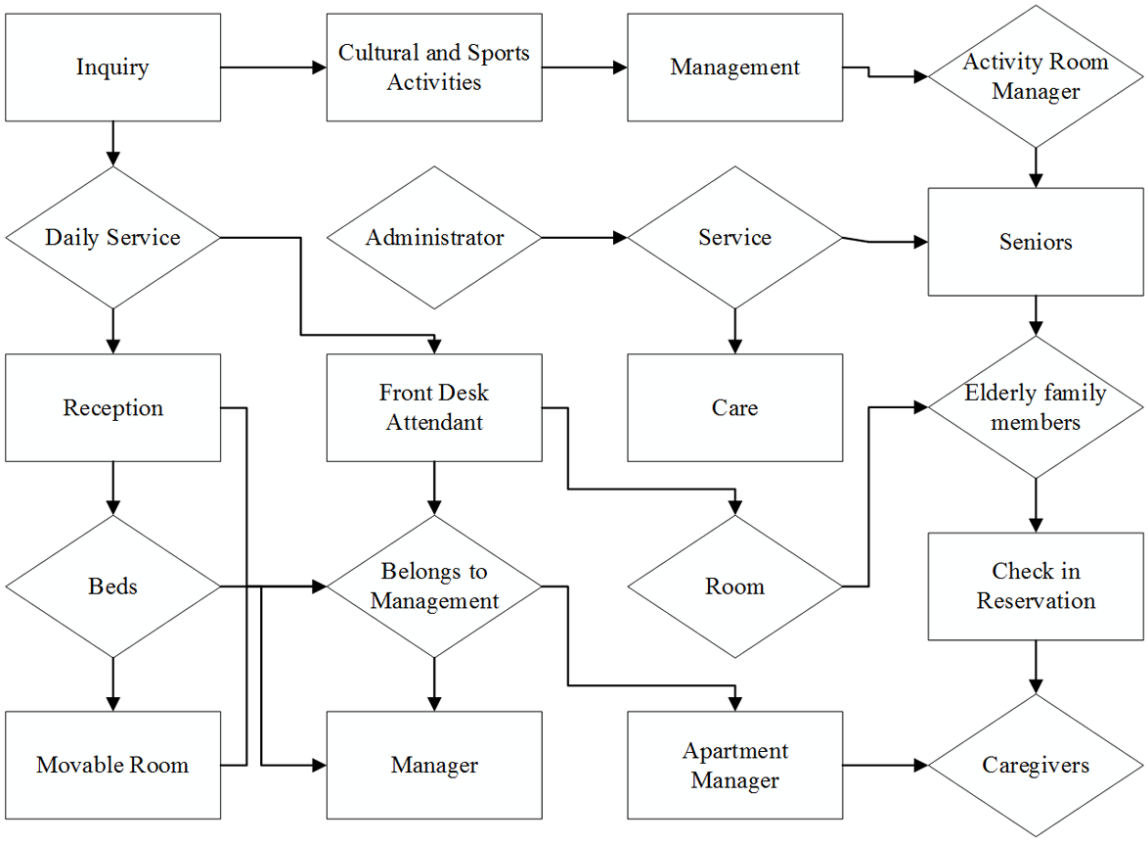

Figure 4. Overall system diagram.

tem to obtain the performance of the management system under strong pressure conditions and determining the bottleneck of the system performance. The stress test was conducted mainly for the core business modules of the HIS system (i.e., registrations, outpatient charges, medical order entries, medical order reviews, medical order executions, drug applications and discharge settlements).

As a user and real-world-oriented data model, no connection lies between the conceptual model and DBMS. The model is primarily a description of the conceptual structure of a unit. At the beginning of the database design, designers can use this model to understand and describe the real world, and those technical issues related to the DBMS must only be considered in the specific design phase (**Figure 4**).

In this study, we successfully monitored the recovery of the mucosal cilia function after endoscopic surgery for chronic sinusitis using the saccharin test, which could fully reflect the cilia transport function, and preliminarily demonstrated that sinus irrigation solution can significantly accelerate the rate of nasal mucosal cilia transport and promote the recovery of nasal mucosal cilia function as compared with compound saline. The recovery of mucosal cilia after nasal endoscopy for chronic sinusitis was successfully observed using scanning and transmission electron microscopy, and the sinus irrigation solution in the treatment group was confirmed to promote the recovery of mucosal cilia in the operating cavity.

The exception handling system and system functions were reasonably designed to divide and manage the classification, level and corresponding handling mechanism of error information. In case of system abnormality, clear and easy-to-understand Chinese prompt messages are used to explain the errors of system functions and pages, thereby facilitating system operation and enabling maintenance managers to determine relevant causes and solve prob-

lems promptly. By centralizing the configuration of software and hardware facilities, the subsequent operation and maintenance costs of the system are effectively reduced. Because the system is built and deployed as a distributed application with centralized management, the system business managers can manage and maintain the system equipment, application software and system data centrally [22]. The system is configured through simple, easy-to-learn and easy-to-use operations, and the system equipment, security, reliability and operational performance are well monitored, thereby effectively improving the ease of maintaining the system management.

The solution designed should consider the flexibility and scalability of the system. The system should be able to meet the needs of the rapid growth of data and business in near, medium, and even long-term periods. By adapting to current needs, it can satisfy the evolving information needs of hospitals and related medical institutions, fully allow room for foreseeable and unforeseeable performance expansions, easily expand the system capacity and processing power to support multiple applications, and be flexibly and quickly adjusted according to the needs of business development to achieve rapid deployment of information applications and new functions. The increase of new functions and services can be realized without affecting the system operation. The system should fully consider the need for expansions and upgrades and can flexibly and easily adapt to possible future system changes. Products that apply open standards should be chosen to ensure the compatibility of equipment; the foundation for future system expansion should be laid through the reasonable design of the system structure and moderated resource redundancy to ensure a smooth system expansion when demand increases, thereby warranting preliminary investments.

Results

After accessing various services, the medical service bus management module updates the API document. The API document presents the common access of the management platform for the three types of service interfaces and request-response examples of specific services, including the signature algorithm for data. All service requesters can obtain the interface information they want through the standard definition in the API document and invoke it following the API convention.

The business system operation and maintenance personnel of the service demander can check the API document, clarify the service they require, apply for the interface operation in the interface application module, and add auxiliary information, such as the reason for application and application duration, and the administrator can then approve the operation. The service administrator can obtain the application information of the audit business system in the application approval module and then authorize to invoke the authorization token with the interface through the token. The token must be unique, and UUID is used to authorize tokens. The administrator can assign the authorization length of the service if it is a temporary test interface; the authorization length can be 1, 7, 30 days, etc. The official service interface is authorized to be used for a long time. If the authorization time range is exceeded, the business system can initiate an authorization extension and continue to use the service normally after reapproval. For the same service applied by different business systems, the authorization token will still be different to ensure the security and traceability of the service interface. The business system must pass this parameter when calling the service interface of the integration platform, and an incorrect or non-existent platform returns an error, as shown in **Figure 5**.

As shown in **Figure 6**, nearly 70% of the information load capacity of other nodes limits the directness influence of key nodes. At this point, the problem should be analyzed in terms of the information load capacity of other nodes. Other similar statements indicate that the abovementioned users are already free from diseases or have rich treatment experiences, and the urgency of medical health information needs is relatively low. This means that the direct information interaction process between the key node “Hollows” and these nodes maintains a high relationship strength, which is sufficient for occupying a low demand for medical and health information from these users. The ideal influence of the key node is misused. In this

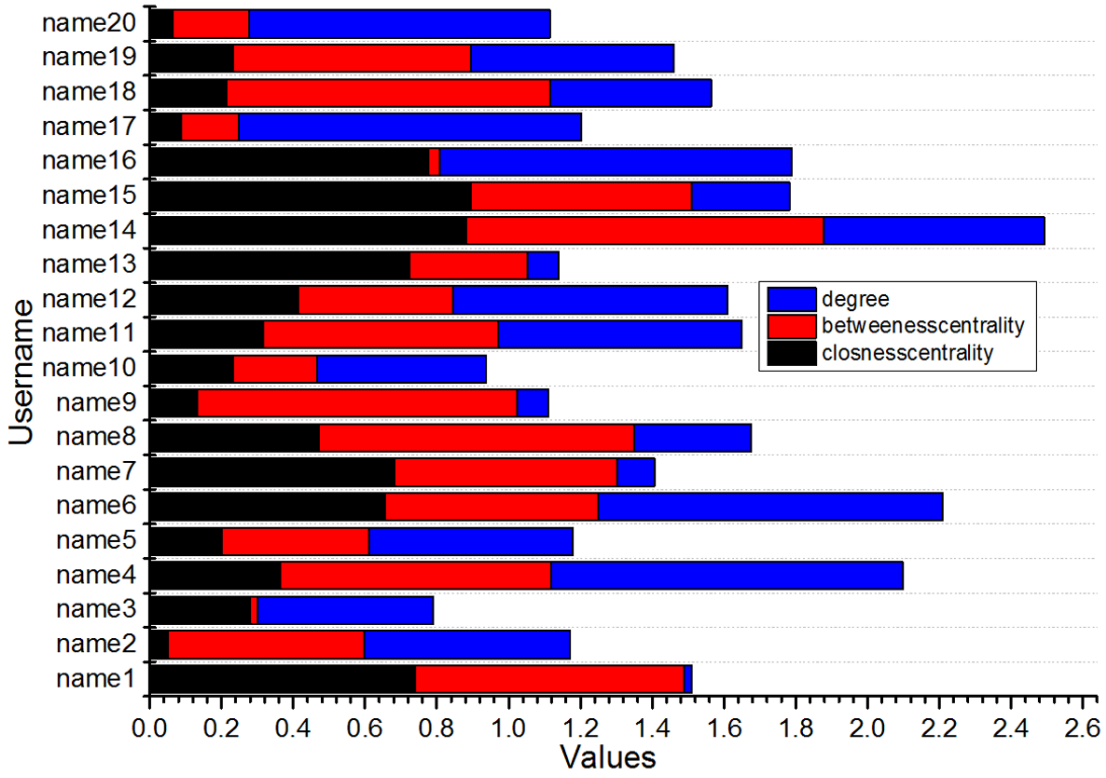

Figure 5. Distribution of bridge ability information interaction variables.

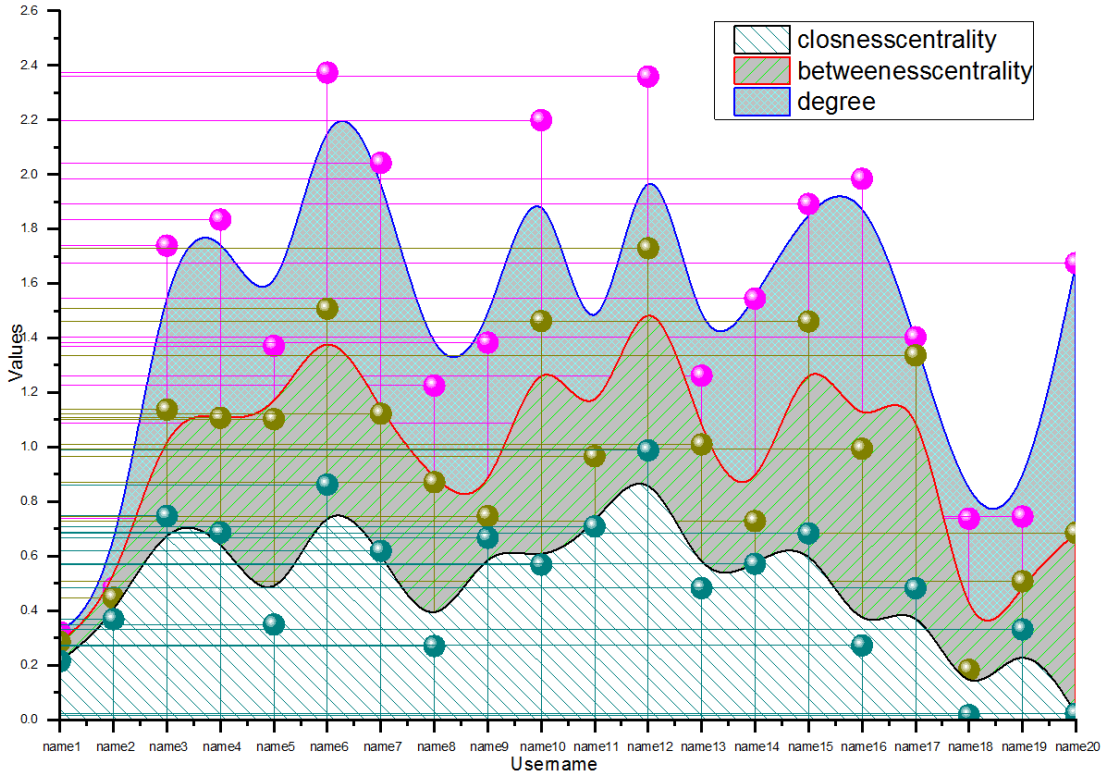

Figure 6. Distribution of indirect information interaction variables.

case, to improve its actual influence, the key node can transfer the effort of the information interaction process with low information-load users to the information interaction process with other high information-load users.

In an experimental analysis of the directness influence constraints, this study determined that members of online healthcare communities expect applications that help identify high information-load capacity interactors to more effective select information interactions between members. The information load capacity of online healthcare community members is measurable, and user behavior data such as the number of active days per month, daily visits, and hours of use can be used as valid metrics. If the information load capacity of interactors is identified, or if members with high information load capacity are used as suggested interactors and service items of online medical communities, members who aspire to be key nodes can reduce the effort of the information interaction process with members with low information load capacities as well as improve the influence of key nodes to better serve members with urgent information needs (particularly patients).

This indicates that sinus irrigation solution can promote and accelerate the epithelialization of the mucosa in the operative cavity more effectively than the compound saline. Sinus irrigation solution, as a postoperative endoscopic rinsing solution for chronic sinusitis, can effectively eliminate mucosal edema, promote local blood circulation, facilitate fraction absorption, promote mucosal growth, accelerate epithelialization, contribute to mucosal regeneration and repair, and improve the function of mucus cilia clearance and restore its own protective and defensive functions. The manner in which Chinese medicine preparations are administered through the mucous membrane of the nasal cavity and sinuses has changed the traditional route of administering Chinese medicine, allowing the active ingredients of the medicine to act directly on the diseased mucous membrane, which can more effectively introduce the effect of the medicine and improve the bioavailability of the medicine, as well as the local and overall therapeutic effect.

In the experimental analysis of the bridging influence constraints, this study determined that members' dependence on online medical communities, as well as a more limited positive level of information interaction with neighboring members limited the bridging role of key nodes in the network of information interaction relationships. The higher knowledge flow efficiency of key nodes benefits online medical communities. However, bottleneck nodes in the information chain can eliminate the positive contribution of key nodes. Members represented by key nodes cannot change this, and the online medical community must develop corresponding program functions and implement a series of incentives, such as visit reminders, attention alerts and friend recalls, so that strong linking relationships can be formed among members and to better ensure high knowledge flow efficiencies among key nodes.

Discussion

To be able to effectively represent the stability and practicality of the system, the most representative KDD network dataset was chosen to complete the testing in this study. This dataset is typically used as a target for training datasets that can compare well with the practical value of various intrusion detection methods. The KDD dataset covers the following types of data: 1) general data, 2) denial of service (DOS), 3) local privileged user access (R2L), 4) detection or probing (PROBE), and 5) remote unauthorized access (U2R). Each data record covers 41 attributes: 9 discrete and 32 continuous. In addition, each data record covers multiple levels of data sets, among which the more representative ones include host traffic and network traffic, etc. For such cases, the basic attribute set is an essential part of each connection record. It should be noted that other attribute sets are obtained manually, which benefits the implementation of intrusion detection. The following table provides a basic description of the attributes. After the analysis, the data type information is obtained, and the total number of normal data records is 39,200. This study considered the experimental requirements to select the KDDcup99 dataset. **Figure 7** shows the data category, number and ratio.

As the main component of the rinse solution, saline can effectively remove accumulated blood and nodules, clear nasal and sinus cavities and other surgical secretions, and provide

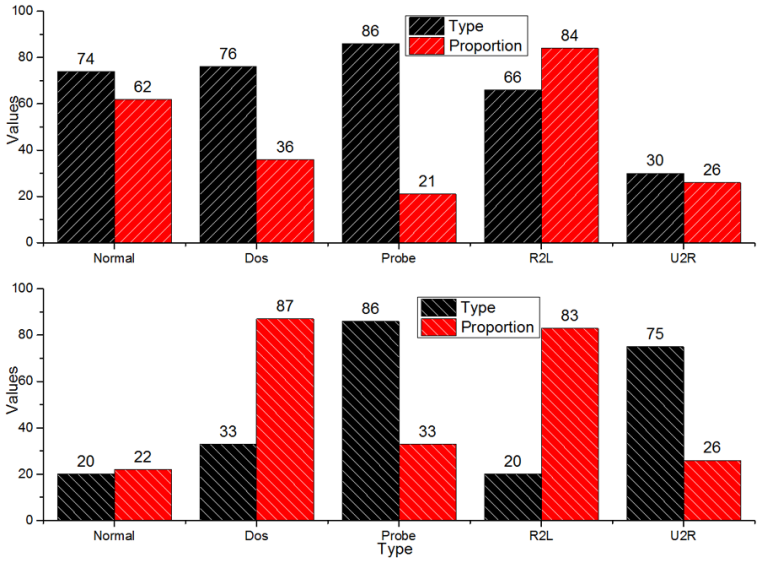

Figure 7. Training set category, number, and proportion.

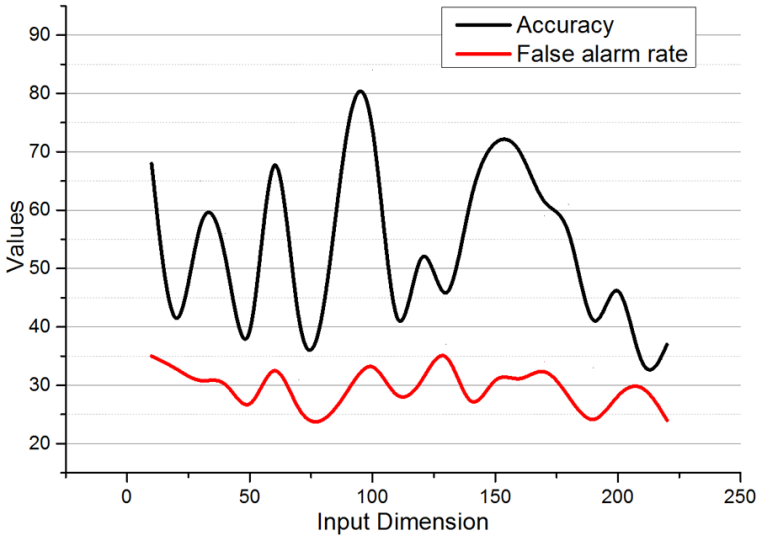

Figure 8. Input dimensional impact on performance.

a physical flushing effect. Warm saline maintains the nasal cavity moist, promotes local blood circulation, and facilitates ciliated mucociliary clearance, resulting in a marked improvement in reduced mucociliary clearance. Glucocorticoids can effectively inhibit mucosal vascular permeability, reduce tissue edema, and lower the concentration of protein in nasal secretions, which can reduce inflammatory cells. In particular, the aggregation, infiltration and activation of eosinophils can significantly reduce the inflammatory response and metaplasia. Gentamicin is a broad-spectrum antibiotic.

To select the most suitable input dimensions, eight input dimensions were arranged, and their actual effects on the experimental results were analyzed. **Figure 8** shows the results. The accuracy rate increased in the range of 10-130, and was highest when the dimension reached 130. The difference between the accuracy rates when the dimension reaches 100 was small, which was primarily in the range of the latitude. The false alarm rate was primarily in the range of 10-100, showing a decreasing trend, and the false alarm rate reached 12.51% when the input dimension was 100 and then continued to increase. The accuracy rate was at a relatively high level when the dimension was 100. At dimension 130, the experimental accuracy reached the limit. However, the false alarm rate was also at a high level. Overall, the experiment was most effective when the input dimension was 100. Therefore, the data input dimension was set to 100.

Using the above table, the convolutional kernel size was observed to have a weak effect on the false alarm rate, whereas the size of the convolutional kernel significantly affected the accuracy rate. The accuracy rate varied homogeneously with the kernel size. The accuracy rate reached the limit when the kernel size was 3. After the kernel size increased, the accuracy rate decreased to a certain extent, and the level of downward adjustment increased. Therefore, when analyzing the convolutional kernel size, selecting a kernel size that is too large is impossible. However, the effect of this factor on the false alarm rate was relatively weak, and the false alarm rate reached a mini-

mum value when the convolution kernel size was 3, indicating that the experimental results were satisfactory.

This study provides an in-depth analysis of the influence of key nodes in online medical community information interaction relationship networks, which guides the enhancement of their ability and effectiveness. In addition, this study improved the entropy power method to dynamically evaluate the influence of key nodes in online medical communities, verified the effectiveness and application value of the proposed evaluation method, and aimed to enhance the influence of key nodes in online medical community information interaction network in real problems. Then, based on the practical problems and research findings determined in the sections summarizing the difficult problems in online medical communities, we systematically discussed the practical significance of key node enhancement in online medical community information interaction relationship networks and proposed corresponding countermeasure. The technical and functional advantages of the enterprise service bus were fully utilized, and the management, message and core service modules of the complete medical service were designed and realized according to the layered model and functional requirements, which well applied the medical service bus to the actual business process of the hospital and promoted the information integration and standardization transformation of information interconnection of hospitals.

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Disclosure of conflict of interest

None.

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