Research Article
Research and Development on Health Care Information Service System

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Abstract: With the analysis of Chinese people's diet, medication, physical condition and medical treatment, a set of health care system complying with the local feature was designed in the study. Through the software engineering method, the development of a set of health care system software based on B/S structure was completed. The using result showed that the system can provide a good health care service for doctors, hospitals, patients and healthy people.

Keywords: B/S, Health Care Information Service System (HCISS), software engineering

INTRODUCTION

Health Care Information Service System (HCISS) can be defined as massive, integrated systems that support the comprehensive information requirements of hospitals, including patient, clinical, ancillary and financial management. Hospitals are extremely complex institutions with large departments and units coordinate care for patients. Hospitals are becoming more reliant on the ability of Health Care Information Service System to assist in the diagnosis, management and education for better and improved services and practices (Shaikh et al., 2008). In health organization such as hospitals, implementation of HCISS inevitable due to many mediating and dominating factors such as organization, people and technology.

As an area of medical informatics the aim of an HCISS is to achieve the best possible support of patient care and outcome and administration by presenting data where needed and acquiring data when generated with networked electronic data processing. Health Care Information Service System main demands are correct data storage, reliable usage, fast to reach data, secure to keep data on storage and lower cost of usage.

Health Care Information Service System provide a common source of information about a patient's health history. The system have to keep data in secure place and controls who can reach the data in certain circumstances. These systems enhance the ability of health care professionals to coordinate care by providing a patient's health information and visit history at the place and time that it is needed. Patient's laboratory test information also visual results such as X-ray may reachable from professionals. HCISS provide internal and external communication among health care providers (Bhandari and Snowdon, 2012).

The HCISS may control organizations, which is Hospital in these case, official documentations, financial situation reports, personal data, utilities and stock amounts, also keeps in secure place patients information, patients medical history, prescriptions, operations and laboratory test results (Ligang et al., 2013). The HCISS may protect organizations, handwriting error, overstock problems, conflict of scheduling personnel, official documentation errors like tax preparations errors.

In the development of the software, this system used Browser/Server (B/S) structure mode. The biggest advantage of B/S mode is that the mode can be used in anyplace and do not need to install any software and, only a computer linked with the Internet is enough. So for the client using the system need no installment and no maintenance. And the extension for the system is also very easy. Since the HCISS system must face many client, so it will be very inconvenient to install a system for each computers, so the B/S mode is very suitable for development of HCISS system (Peilong et al., 2013).

MATERIALS AND METHODS

According to the B/S data model, this system can be divided into three levels:

- Expression layer
- Function layer
- Data control layer (Fig. 1)

The system adopts the modularization design program, which can be divided into two modules of

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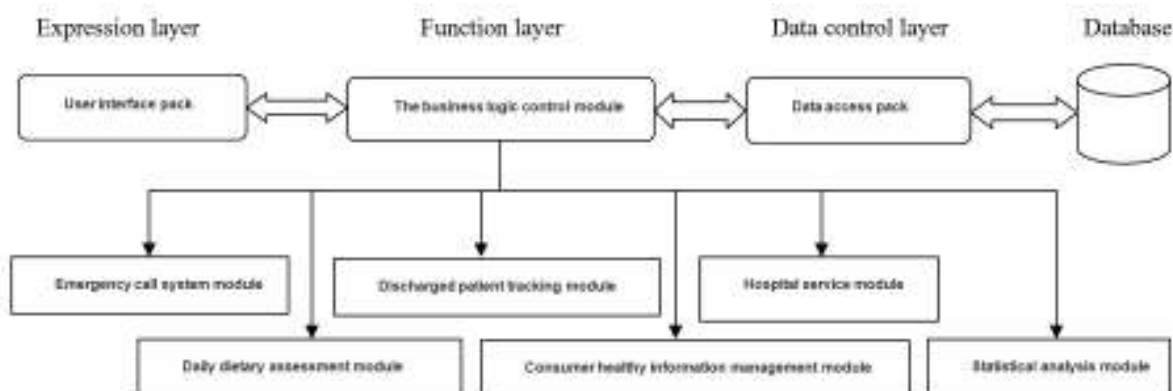
Fig. 1: The HCISS system structure diagram

maintenance system and using system. Each is equipped with the independent part controlled by the host system (Thompson and Matthew, 2009). Wherein, the module for using system mainly includes emergency call system module, daily dietary assessment, discharged patient tracking module, consumer health information management module, hospital service module and statistical analysis module. The function of each module is as follows:

- Confronted with the emergency medical situation, it can contact with the hospital's emergency center through the system to develop the effective rescue for the patient with the fastest speed. In the module, the duty doctor in the hospital emergency department can effective guide the patient's family on the patient according to the real-time video data and combined with the patient healthy status stored in the system before the ambulance arrives (Peilong *et al*., 2013). On the other hand, the information will be sent to the emergency center at the same time and the emergency center will conduct the corresponding emergency preparation according to the information and equip with the first-aid equipment. It can greatly ensure the timeliness and effectiveness of the rescue and improve the success rate. The patient coming to the hospital or return empty and delay at each link will be fed back to the platform through the network by the related department, thus providing an objective basis for the platform to analyze the reason for the appeared problem. The forced entry button has been set in some key links to ensure the timeliness and completeness of the information.
- **Daily dietary assessment module:** In the module, the database will classify according to the investigated group class and meal species. When applied, it can find out the corresponding nutritional component and content according to the specified people, time, the class and amount of ingested food and conduct the statistical analysis. The user needs to log the personal account firstly.

According to the personal information in the account, such as height, weight, labor intensity, population and other basic situations, the class and amount of intake food in a certain time, the analysis system will calculate the corresponding nutrition ingredient class and intake amount according to the input condition and compare with the standard intake amount formulated by WHO, thus conducting the reasonable evaluation on the tester's nutrition condition. In addition to be used for the nutrition evaluation on the hospital patient, the module can be used for the healthy people, such as infants and children's nutrition assessment, thus providing the objective evidence for the dietitians and professionals as the reference basis for the guidance and treatment of nutrition consultation to help the tester to establish healthy diet structure and good eating habit.

- **Discharged patient tracking module:** According to the doctor's advice when patient leaves the hospital, arrange the daily discharge return visit and patient's daily recipe, provide the health care knowledge at home, precaution and referral time remind project and automatically submit the patient's return visit record to each doctor, thus facilitating the working staff to provide the comprehensive return visit service. In addition, the module also contains the hospital service satisfaction degree feedback function, including the evaluation, comment and suggestion collection on the medical staff service quality.
- **Consumer healthy information management module:** It conducts the classified management, analysis and research on the healthy information of hospital consumer and potential consumer according to the preset condition and formulates the routine health care plan and personalized care program. According to the preset schedule, it provides the corresponding information service for the consumers through telephone and text messaging, thus meeting the mass' diverse and multi-level medical needs. It can realize the

networking among the information platform and physical examination center and outpatient and hospital information system, timely respond to the treatment information of high-end consumer, introduce the corresponding incentive and care service and improve the consumer loyalty.

- **Hospital service module:** In addition to the remote registration and reservation for specialist service, the module can provide the online medical consultation service. The health care worker can provide the medical consultation for the remote patient and mental health consulting. The expert can conduct the interactive communication with the staff and medical personnel in the school and finally complete the remote diagnosis and treatment of the disease (Yichuan and Jie, 2013). The remote medical consulting can not only provide the continuing education opportunity for medical personnel, improve the medical level of the health care personnel, particularly those in the remote areas, but also provide a platform to learn the medical knowledge for the ordinary patient and health people, improve the health level and the ability to prevent the disease, thus neglecting any intermediate links for the various information between the doctor and patient.

- **Statistical analysis module:** The module can realize the user's physical condition analysis and evaluation function in the client end. According to the own situation and intake amount of various microelements, nutrients and energy, analyze user's physical condition with the nutrition catering function. The hospital can conduct the datamation and comprehensive manage on the above businesses and analyze the system through advanced statistical report to conduct the centralized statistics and analysis and research on the collected service quality feedback information from each channel, objectively, comprehensively, scientifically and rapidly reflect the service quality status on the hospital and provide the objective basis for the hospital to add the service project, improve the service process and adjust the service strategy.

RESULTS AND DISCUSSION

Since June 2012, the system has been used in affiliated hospital of Guangxi Medical University for over 1 year, the average satisfaction of discharged patient keeps over 98.7% and the consumer loyalty has increased from 57.65 to 83.17%.

- The platform has received the emergency telephone call for 894 times. With the real-time feedback and effective monitor of the software system, the ambulance dispatching efficiency has improved significantly. The average dispatching time is 89 sec. Before the patient comes to the hospital, the medical staff in the emergency center

has known the number of emergency patient, rough etiology, severity of illness and emergency equipment needing to be prepared. At many times, the specialist will wait at the emergency room in advance of the patient to ensure the timeliness of the first aid, thus improving the rescue success rate, realizing the 120 emergency system's managing objective to timely process, real-time monitor and technology linkage.

- The service module has received the appointment registration for 1853 people and the treatment advice for 4385 people, greatly facilitating the social masses. In the system, we can not only understand all related contents on the business in our hospital, such as service project, project cost, treatment guideline, expert patient time, but also gain the disease health knowledge through the system. The return visit for the discharged patient through the system is 6821 people. Caring patient's recovery, providing the home care and health knowledge, reminding the patient's on-time review and collecting the service quality feedback information can not only improve the patient's satisfaction and loyalty, but also perfect the hospital service quality monitoring system. It has received the telephone complaints for 17 times. When receiving the complaint, the staff will appoint the response time with the complainant, after transferring to the related departments, implement the two-way visit on the complainant and complaint handling department within the limited time and track the treatment result. The complainants are very satisfied.

- The hospital releases the satisfaction consultation table for every inpatient and a certain percentage of outpatients and collects 1861 patients' opinions and suggestions. With the statistics, analysis and management of the opinions and suggestions, it provides a powerful basis to improve the working process, beautifying the medical environment, adding the convenience facilities and increasing the service project with the direction of patient's demand. For example, free the queue up for the referral program on the patient for subsequent visit; implement the cross work in the medical departments and business center, inspect at the staggering peak, reduce the outpatient and inpatient's waiting time for the inspection; open the maintenance service special hotline, provide the maintenance acceptance and monitoring service for the whole hospital. The patients are satisfied on the working style to implement and reply to every piece of work in the hospital.

CONCLUSION

The development and application process of the system can obtain the following conclusions:

- It has analyzed the shortcomings on the hospital service management centered on the patient and user's demand. Combined the software engineering method based on B/S structure and health service information, it provides more individualized and human service for users and achieves better social benefit and economic benefit.
- Over a year's trial operation can show that the set of system plays an important role on the communication between the hospital and the individual. Patient's satisfaction has increased and the complaint has decreased, thus indicating that the system has better completed his own mission.
- In consumer's daily health care work, the system can calculate the healthy status according to user's physical status and food intake amount, automatically complete the calculation on the various microelements, propose suggestions on user's catering and play a good supporting role on user's healthy diet.

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