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## The portal platform design for resource service of hospital information which is based on electronic medical record

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### ABSTRACT

The portal platform design for resource service of hospital information should be designed by service as the central idea, achieving this ultimate goal of electronic medical records management systems through the design process. In this paper, combining the electronic medical records system design process of Web service workflow to make the corresponding discussion, and then making the corresponding research process through the module of electronic medical record system, which can maximize the development of the system function, at the same time, it is not only improving work efficiency and having a positive effect for health care workers, but also having a positive role in promoting on the rapid development of medical institutions.

### KEYWORDS

Electronic medical records; Information resources; Service management; Platform design.



## INTRODUCTION

The portal platform design for resource service of hospital information can have a positive impact on sharing patient information resources, while providing effective power working for the conduct of medical institutions' scientific research. Electronic medical records provide comprehensive feedback effect for patients with physical conditions, and it is the root of effective health care treatment for patients. The construction of the portal platform design for resource service of hospital information is conducting the information resources through effective comprehensive collation, ultimately achieving the full range analysis of pathological effects, thus also providing the basis for easing later period of effective service. In this paper, effectively building this platform with the combination of Web service workflow's electronic medical records system, and then making the further discussion and study for modular design functions.

### **THE DESIGN OF ELECTRONIC MEDICAL RECORDS SYSTEM WHICH IS BASED ON WEB SERVICE WORKFLOW**

#### **The analysis of applied requirements**

Electronic medical records are usually carried out to establish, use and storage by the relevant medical institutions, which is one of the main ways for the majority of residents in terms of their own health information sources. In theory, electronic medical records can not only reflect a person's physical health, but also accompanying a person's life as an important source of health data. And the medical institutions are effectively processing data in each visit process, gradually making the electronic medical records have an effective recording from a single data to human's overall health data. From this function which is possess by electronic medical records, we can make the following descriptions:

(1) Medical records: From the perspective of patient, electronic medical record means the overall record of the patient's treatment, which also contains a summary of the patient treatment process. And conclude all of the related information, such as the basic information for patients, the disease recording process, the each test results and the instructions of health workers and emphasize links etc. in this process<sup>[1]</sup>.

(2) Patient's experience and efficiency: during the extraction process of the electronic medical record, in order to complete the extraction process, system needs to repair the extraction of electronic medical record, but this extraction link of electronic medical record always producing the greatly hindered affection for the workers' efficiency. However, if the applied system of HTML can be realized, then the speed of patients' extraction process actually can be guaranteed, while the workers can achieve the continuous improvement of the work's efficiency

(3) Archives: For medical workers, the research work means that in the field of one clinical treatment can get a better break, which also means the experience of the clinical course of the treatment process has been a positive affirmation. The electronic medical record is the first-hand information for the medical workers during the process of carrying out the research work, and also has been rigorous recording process for the analysis of cases of patients and the treatment process, providing effective practical basis for a breakthrough of ongoing research work.

(4) Medical help: For the majority of medical staff, filling in the electronic medical record is undoubtedly provide great help to their process of effectively going against the disease, as well as the cooperating tools for which medical workers are operating the effective treatment for patients. Its meaning is not just input the stored content on paper in a computer, it is an important way to make the effective summary of the existence of the patient's own disease, it is also the root certificate lies that in order to ensure timely and effective treatment for patients. While for electronic medical records, maximizing the development of its network's information function. Make the effective summary and

develop the comprehensive analysis for the each data of patients, and then providing adequate supporting role for the medical staff to determine the patient's condition effectively<sup>[2]</sup>.

(5) Distributed heterogeneous environments: electronic medical records as a comprehensive record of the specific process of patient visits, for the purposes of the majority of medical institutions, the information should be properly preserved, and to some extent, the sharing of resources can be achieved in various departments of medical institutions, and it relates to the information's interactive process between the patient and the health sector in this process.

(6) Medical execution efficiency: among medical institutions, we should make a targeted response to electronic medical records department setting, so that these specialized information can be properly preserved, and providing convenient services for carrying out the latter part of the work effectively. The construction of the information service platform is particularly important among this process, in order to be able to reduce the save costs of electronic case, while as for the workers, producing the positive effect for the improvement of the work's efficiency.

### **Design goals**

Starting point for electronic medical records system design is patient-centered, making the effective preservation and recording for their physical condition, so that making the case data has stronger persuasion, and can provide an effective guarantee by more scientific and effective treatment options for patients. Among this, it should have the flexibility, the systematic data, comprehensive analysis and several other features.

(1) Safety: the so-called safety is that electronic medical records is a comprehensive record of the patient during treatment, and the specific procedure has the appropriate legal effect, which also belongs to the part of the patient's own privacy. So in the process of electronic medical record system design should have the appropriate security mechanisms which can be run simultaneously, Users should be authorized by the patients in the process of using information, so that the patient's privacy can be carried out in effective confidential.

(2) Normative: normative raised not indicate which the existed problems of paper records, more importantly, it is the standardization of the writing process requirements. Electronic medical records can be present in patients' information with effective consolidation, it is also convenience for the comprehensive summary of data and the development of analytical process of the data in the later period, providing good conditions for developing medical institutions' research work and the further use for patients<sup>[3]</sup>.

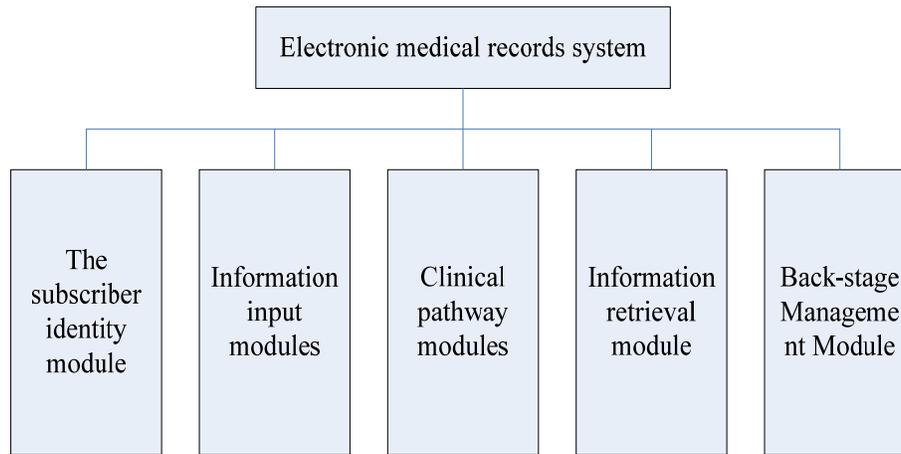
(3) Timeliness: the effectiveness of the main aspects that can be reflected in the patient's own situation as quickly valid judgment through electronic medical records, while ensuring that we can have more intuitive understanding of the patients' situation accordingly, reducing the "wasted effort" which is made by diagnosis.

(4) Integrity: The design of electronic medical records system primarily is based on the service function as the fundamental starting point, making the case data and related information can be effectively reflected. Its integrity can be fully reflected in this process, and the integrity of the main covered content include basic patient information for treatment, while the inspection process of the body indicators were clearly marked. Make the effective record for a series of reflected situation and the specific measures which is adopted by volunteers that occurred in patients after treatment employed. Which also include the specific time, place, performed by the name of medical workers, etc. These can be reflected by text, images, data.

### **System architecture**

Electronic medical record system mainly based on the basic concepts of themselves and related architectures for further exploration during the process of building structure. Its main contents should include an overview of their case, several important part of the outpatient service (emergency treatment)

medical records. In this process, making the further analysis for the covered functions of the electronic medical records system, in order to make electronic medical records system architecture can play a maximum degree of function by itself (specifically, as shown in Figure 1)<sup>[4]</sup>.



**Figure 1 : Schematic the process of system architecture's construction**

Here for electronic medical records systems to make the related introduction:

**User Authentication Module:** it is mainly for the information with the patient's own certification process, causing the electronic medical record has a strong confidentiality, so the medical staff should limited the use of their electronic medical records accordingly.

**Information Input Module:** it is mainly targeting in the process of electronic medical record data and information's entry and uploading, due to the expression of electronic medical records is mainly recorded by language text, images, data and other forms, so we should combine this regard to make the friendly interface design in the process of interface design, in order to improve the efficiency of medical workers.

**Information retrieval module:** it is mainly used in the retrieval process of current region and non-regional patient information, which is a vital part in the retrieval process of electronic medical record, which will be emphasized on the following discussion.

**Clinical pathway modules:** it is mainly targeted on the related test results, the therapeutic treatment, and related accidents caused by therapy which are effectively recorded during treatment of patients, at the same time, making the analysis for this module in the subsequent study process.

**Background management modules:** it is mainly used for background maintenance and setting process in the process of electronic medical records.

### **Information input module**

During the incoming process of data in electronic medical records, the relative thorny problems is that how can effectively reflect the flexibility of the electronic medical record data transmission and simplicity during our research process. And in this respect among the stored data to achieve a reasonable structure is a bigger challenge, so as to achieve this goal is truly reaching a pragmatic goals in the build process of the electronic medical record system<sup>[5]</sup>. During the system building process, through Ajax technology conducting the process of building MVC (specifically shown in Figure 2) at customer sites, the generation of this direct effect can make a more direct experience process for the patients, while ensuring to form separation between the code and cases. However, when the case data's transfer is complete, which can make the case data be assigned and stored for a short time in one storage area, and uploading the unified data when the patients are completely filling the case. The advantage of this

process is making that the broadband resources can be guaranteed, while for the number of cases of exchange between the server and the patient's formation can be significantly decreasing, so the medical staff can continue to improve their work efficiency.

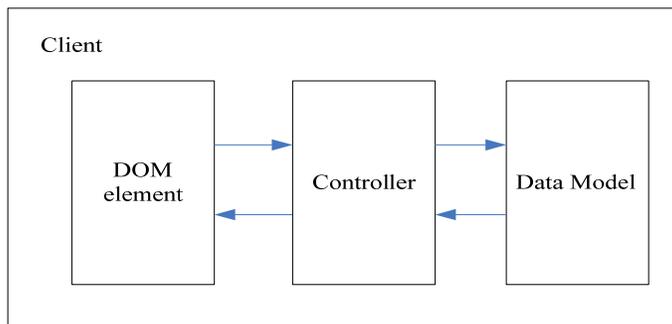


Figure 2 : The architecture diagram of client MVC

### THE MODULE DESIGN OF AJAX-BASED INFORMATION ENTERING

For the client part of the building program, considering many factors from the complexity of the requirements, technical operating environment deployment costs, technology licensing costs and so on, the electronic medical record system is based on RIA development technologies of JavaScript / Ajax. But because JavaScript exists the issues of compatibility, it will differ in different browsers, which also requires the developer to judge. In addition, the basic JavaScript script code function is weak, so that a rich class library is very necessary, moreover, make the functions become more powerful. For these reasons, determining to process supporting development with the Ajax framework.

TABLE 1 : Patient Information Sheet

column name	type	description
PID	Bigint	Patient Number
PatientName	Varchar(20)	Patient Name
bornDate	Datetime	Patient Date of Birth
Gender	Brgint	Patient sex
email	Varchar(20)	Patient E-mail

In traditional Web applications, we have been able to apply existing well proven model to achieve the desired application, after introducing into Ajax, along with changes in application mode, for lack of asynchronous communication model's support, making many aspects are affected, such as the development of clients, and integration of Web frameworks, the using way of tag libraries and so on, it will destroy the integrity of some mature framework in the traditional thinking<sup>[6]</sup>. But as long as certain aspects of the framework for minor modifications, can fully meet the demand.

TABLE 2 : Hospital information table

column name	type	description
Admission ID	bigint	Number of hospitalization
PID	bigint	Number of patients
AdmissionByUID	bigint	Number of hospitalized creator
AdmissionDate	datetime	Create a hospital stay
tfDischarge	bigint	Discharge or not
DischargeDate	datetime	Discharge time

Based on the above analysis, and according to the project requirements, code modularization and other factors, the electronic medical record system uses Extjs framework as the way of RIA implementation.

**TABLE 3 : prescription template table**

column name	type	description
orderentryID	bigint	Number of prescription template
orderentryName	Varchar(20)	Process template name
admissionID	bigint	Number of hospitalization
orderentryStatus	bigint	The status of prescription template
createdTime	Datetime	The created time of prescription template
createdByUID	bigint	The created doctor of prescription template

Role of the client is no longer just a presentation page which can be calculated by a user asynchronous request, deliver and retrieve data, display an integrated user interface. Application is described as a collection of UI components, which is presented by sending HTML and JavaScript flow to present themselves to the browser. In addition to collecting the browser sends to the controller and the domain model of request individual components, each component also contains its own small-scale model, view and controller.

**TABLE 4 : prescription entry table**

column name	type	description
orderitemID	bigint	Number of Doctor catalog
orderitemName	Varchar(30)	Name of Doctor catalog
orderentryID	bigint	Number of prescription template
TYPE	bigint	Type of prescription entry
Starttime	Datetime	Executed beginning time of doctor entries
Stoptime	Datetime	Executed ending time of doctor entries

The main work of electronic medical records is providing the establishment of patient assessment application for doctors. User interface of the drug application, and need to establish a patient information form PatientInfo (TABLE 1), hospital information table AdmissionInfo (TABLE 2), prescription template table OrderEntry (Table shown), prescription entry table OrderItem 3 (table below), prescription drug class table OrderItemMed (TABLE 5), prescription drug class execution table OrderItemMedRecord 4 (Table 6).

**TABLE 5 : prescription drug class table**

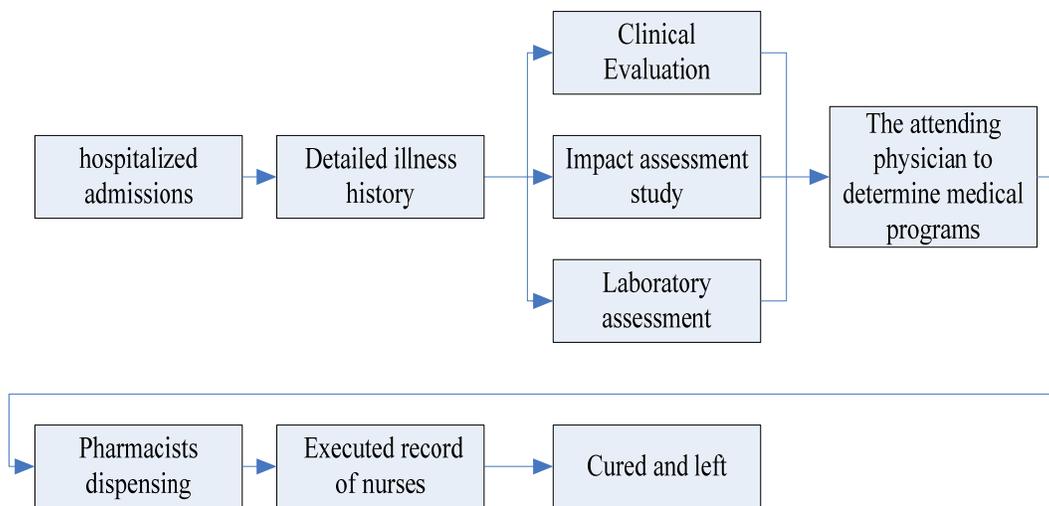
column name	type	description
orderitemMedID	bigint	Number of prescription drug class
orderitemMedName	Varchar(20)	Name of prescription drug class
orderitemID	bigint	Number of doctor entry
orderitemMedStatus	bigint	Status of prescription drug class
medUnit	Varchar(20)	Drug Unit
medDose	bigint	Drug dose

**TABLE 6 : prescription drug class execution record form**

column name	type	description
medRecordID	bigint	Executed record number of prescription
orderItemMedID	bigint	Number of Prescription drug class
RecordByUID	bigint	Executed user
RecordedTime	Datetime	Executed time

**CLINICAL PATHWAY MODULE DESIGN**

Clinical pathway modules design is composed of each medical staff and medical institution, it has being a strong professional among this. For the diagnosis of the patient's condition, disease or scientific and reasonable surgery schedule, and thus make electronic medical records play an important role in the whole module, the following is making the related process of reflection and description for people throughout the whole diagnosis and treatment process (as shown in Figure 3).



**Figure 3 : The diagram of patient treatment process**

Patients hospitalized during the treatment process, firstly, the visiting staffs were assigned by the hospital sector, secondly, making the preliminary diagnosis according to the patient's presence of the disease experience. After this the appropriate treatment is processed with the same corresponding department, here is mainly referred to the image data and test laboratory sectors. And according to the relevant test results to their physician for further observation and treatment by visiting staff, the drug therapy is mainly for the pilot, if the continuous administration does not reduce patient symptoms, then the further course of treatment should be used. Firstly, combined with this aspect of going to therapy to make further process of discussion, through the process of receiving prescription drugs, the related medical workers is making the corresponding record, which contains basic information about the patient, the medicine time, the number, as well as the type and quantity of prescription drugs contained. these need to be clearly documented, which are also reflected in electronic medical records, and then providing an initial bedding in for the smooth process of the patients to get rid of medicine in post time, thus gradually reducing the time for the process of getting the medicine and treatment and having a positive impact on the efficiency of its work<sup>[7]</sup> After transferring data into the electronic medical record system in the process of conducting dispensary, there will be a module to make the specialized response for the implementation of the drug in this system. And it is the specific information which is mainly recorded by this, including the above section as well as the status indicator for a particular drug-related

would require the staff to make the specific analysis and records, such as blood pressure drugs that affect the human body, requires a patient's temperature drugs and so on. However, once the index value does not reach under the situation which the system will not trigger the corresponding rules, so the system will stop working, which makes medical workers can effectively test for these indicators. However, an indicator appears outside the scope of the standard, the system will repeat the above process.

The last one is patient illness to be cured, after paying the related quality payment, according to the system prompts for information about post-operation, health care workers will make the corresponding post guidance for patients, and this process is carried out with a selective, for which clinical pathway module design process is complete.

## CONCLUSIONS

This is the related research that targets on the portal platform design for resource service of hospital information from what have been said. This being mainly combined with electronic medical record system design which is based on Web service workflow, information input module design which is based on Ajax and the clinical pathway module design this three aspects to develop. Making the process of research and discussion in this paper has a strong theoretical foundation as a support, while providing a solid theoretical foundation for further study late.

## REFERENCES

- [1] Shunfei Li, Xiaodong Tang, Shunan Liu, et al; The Design and Application of the New Electronic Medical Records Medical Records Quality Management System, Chongqing Medical, **43(19)**, 2452-2454 (2014).
- [2] Xiaohan Sun, Yaolong Li, Jingyan Li; Secure Electronic Medical Records Research and Design, Laboratory Research and Exploration, **33(5)**, 17-19 (2014).
- [3] Yongjun Xu; Empirical Study of Electronic Medical Records in Patient Privacy Issues - Treat W City Four General Three-Level Synthetic Hospitals as a Case, Chinese Health Service Management, **31(4)**, 284-286 (2014).
- [4] Weiping Lin, Suqing Yang, Ya Chen et al; The Efficient Evaluation of Electronic Medical Records and other Forms Templates in the Construction of Excellent Care, Chinese Journal of Practical Nursing, **29(33)**, 62-63 (2013).
- [5] Jianfeng Shen, Wei Wang, Ping Du; Electronic Medical Record Information Sharing Research and Implementation which is based on Health Information Platform, Chinese Journal of Biomedical Engineering, **32(4)**, 504-507 (2013).
- [6] Shao You Yang; The Design of Scientific Research for Electronic Medical Records System, Computer Applications and Software, **30(5)**, 73-75 (2013).
- [7] Xiaorong Lv; Advances in Electronic Medical Records System which is based on Internet Technology, Sensors and Microsystems, **32(1)**, 1-4 (2013).