Study on Early Warning of Safe Drug Delivery for Intelligent Drug Delivery System for the Elderly

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ABSTRACT. *On the one hand, the early warning system for safe drug administration has the characteristics of early warning system in a broad sense, and on the other hand, it embodies distinct characteristics. Therefore, the early warning system should not only have the characteristics of sensitivity, timeliness, high efficiency, operability and expandability, but also have the characteristics of complexity, accuracy and dynamics. To solve the problem that the elderly forget to take medicine in their daily life, an intelligent medicine taking system is designed and implemented, which has the main functions of taking medicine regularly, configuring medicine taking information, warning of taking medicine by mistake, and uploading data synchronously. The use of drug early warning control system has played a significant role in controlling the use of drugs, reducing the medication error rate, improving the medical staff's understanding of drugs, and helping to ensure the medication safety of elderly patients.*

KEYWORDS: *Elderly people; Intelligent drug delivery; Early warning of safe administration*

1. Introduction

The safety of elderly patients is an important subject in current medical treatment [1]. Hospitals are the main places where drugs are used, and medication safety is the focus of elderly patients' safety [2]. However, the increasing variety of clinical drugs makes it difficult for nurses to grasp the functions and precautions of various drugs in a timely and comprehensive manner. Because drugs directly affect the medication safety of elderly patients, hospitals require strict management and standardized use of drugs to effectively reduce the occurrence of serious adverse reactions. Therefore, it is of great significance to construct the safety database and early warning system related to the dose of traditional Chinese medicine for the elderly to identify, prevent and timely and reasonably deal with adverse events caused by improper dose of traditional Chinese medicine, and at the same time, it can further help to understand

the "treatment window" and "dose threshold" of prescription drugs, and provide valuable reference opinions for the clinical use of this single drug.

2. Establishment of Early Warning System for Safe Drug Administration

2.1 Overall technical route

When the doctor's prescription is entered and saved successfully, the early warning module is called. The system compares the drug safe dose database, prescription information and patient's illness information, and displays warning information and recommends the safe dose range if the drug exceeds the safe dose usage. Configure four related system information for the core control module: system time, medication type, medication amount and medication time. After collecting and analyzing a great deal of information, the information collection organization makes predictions and then communicates them to those who need to know the results in various ways of information exchange, so as to formulate further intervention measures. In the intelligent drug delivery system, the self-feedback function of intelligent polymer gel can be fully utilized to form an intelligent regulation drug delivery system with good self-regulation function. Signals can be divided into three periods: signal appearance period, signal enhancement period and signal evaluation period [3]. According to the drug list established by the hospital, the early warning values of these drugs are assigned first, and only the drugs with the same drug code, drug name and drug specification are assigned, and the manufacturers and pharmacies are not limited.

According to the design principles of completeness, minimization, importance, coordination, reliability, sensitivity and representativeness, and based on the data of drug sampling inspection and drug monitoring, adverse drug reactions may cause elderly patients to lose their trust in doctors or have negative emotions towards doctors and seek self-treatment options, which may lead to additional adverse drug reactions. The original data layer stores the original data of collected documents; Through the Bluetooth transparent transmission module, data interaction with the information management terminal is carried out, and four system tasks, such as system time setting, drug information configuration, medication record synchronization and instruction retransmission application, are completed. Medical staff should quickly identify and manage adverse drug reactions to reduce their adverse effects on elderly patients. Pay attention to the valuable drug information, summarize it regularly and submit it to the analysis evaluator. The summary contents include: information sources, detailed information contents, domestic and international trends, and adverse reactions related to the drug in the drug database.

2.2 Determine the database storage structure

Based on the drug database, develop relevant programs, pay attention to the dynamic changes of drug information in the drug database in real time, and summarize it once a month. This will add up the quantity of the drug used. If it exceeds the warning value, it will prompt that the medication is out of range and the doctor's advice cannot be issued and saved. The system will pop up a warning window and ask the doctor to confirm again. Drugs whose dropping speed should be controlled prompt "whether the elderly patient drops too fast". Nurses must confirm the warning words before executing the operation. The judgment area of monitoring and early warning is divided into five areas: no warning, light warning, medium warning, heavy warning and huge warning, and five kinds of warning lights, green, blue, yellow, orange and red, are used as warning signals respectively [4]. Because there are some difficulties in clinical diagnosis of adverse drug reactions, if medical staff prescribe drugs for diseases caused by unrecognized adverse drug reactions, it will further increase the cost and risk of additional adverse drug reactions. The system transmits the wristband two-dimensional code data to the database to obtain the basic information of the elderly patient, then scans the drug two-dimensional code to obtain the information of the elderly patient corresponding to the drug two-dimensional code from the database. According to the key fields of linkage, the prescription information entered by doctors is collected, and whether the drug dose exceeds the safe dose is judged according to the operation rules.

Extract and construct PT-level application database and SOC-level application database from the drug safety database to prepare for the data source construction of the drug safety knowledge visualization system [5]. Merging the constructed VAERS Data subset, the new VAERS SymPToms subset, and the VAERS Vaccine subset, and generating the pt level application database, which will provide the data source for the future drug safety knowledge visualization system (fig. 1).

The early warning system for safe administration of drugs is a system that comprehensively and accurately grasps the running state of the medical system, captures its feed forward information with alert and preventive significance in view of various risks and possible crises, and takes effective guard and preventive measures in time. Adverse drug reaction symptoms are the feedback content of a specific symptom in adverse drug events. Through the mining of adverse drug reaction symptoms, the results of adverse drug reactions can be confirmed finally [6]. It can effectively improve the absorption efficiency of drugs through eye, nasal cavity and gastrointestinal mucosa, reduce the metabolic rate of drugs before being absorbed by human body, and effectively improve the bioavailability of drugs. According to the actual medical safety situation and potential unsafe factors, the medical safety early warning information room confirms the context signal after evaluating the medical safety coefficient. Establishing an early warning system of medical safety in the medical system can predict and alarm the occurrence of adverse medical safety events at an early stage, so as to take effective measures in time.
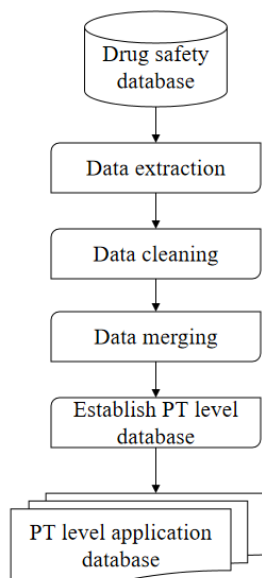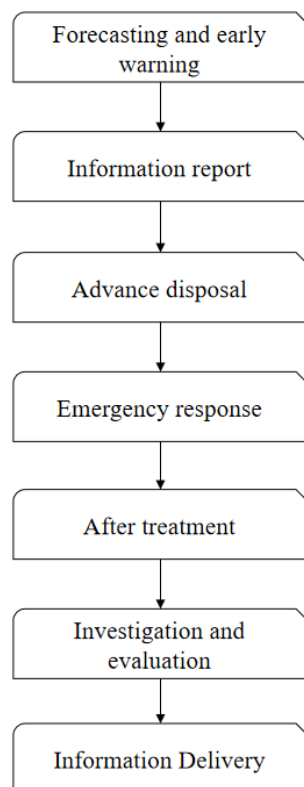
Figure 1 Construction process of PT level application database

2.3 Signal processing

After the police drug warning signal is formed, it will be released by appropriate carriers, such as websites, magazines, bulletins, newsletters, etc., according to the strength of the drug signal (there is no classification standard for signal strength at present, which can be comprehensively considered from PRR value, etc.). It plays an important role in drug safety management to check the accuracy of drug orders issued by doctors in time and effectively. Through the analysis of drug monitoring indicators, we can objectively understand and grasp the overall situation of drug safety in the region, and meet the needs of decision-makers for decision analysis. Determine whether the drug is a drug in the drug list; if it is, sum the doses of the drug contained in all orders of the elderly patient and the currently prescribed doses, compare the sum total dose value with the early warning value of the drug in the drug list, and determine whether the comparison result exceeds the early warning value [7].

An effective early warning system for safe drug administration must have a corresponding early warning mechanism for safe drug administration. See Figure 2 for the specific flow of the operation mechanism of the early warning system for safe drug administration.

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┌─────────────────────┐
│ Forecasting and early│
│      warning         │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│  Information report  │
└─────────────────────┘
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┌─────────────────────┐
│   Advance disposal   │
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│  Emergency response  │
└─────────────────────┘
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┌─────────────────────┐
│   After treatment    │
└─────────────────────┘
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┌─────────────────────┐
│  Investigation and   │
│     evaluation       │
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          ▼
┌─────────────────────┐
│ Information Delivery  │
└─────────────────────┘
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Figure 2 Flow chart of early warning for safe drug administration

Summarized some factors closely related to drug dosage, such as age, illness period, sex, dosage form, medication purpose, physical strength, course of disease, severity of disease, etc. These keywords should be associated with relevant fields of prescription records in hospital information system, so as to produce linkage effect. For possible drug signals, the benefit-risk evaluation is carried out to determine the benefit-risk ratio, so as to take management measures. Cognition and positioning of danger: monitoring and predicting upcoming events; Handle relevant information and issue understandable warnings to the elderly; For example, in the treatment of tuberculosis, the treatment cycle is generally 6 months, and the elderly patients need to bear great pain in the treatment process. If seaweed hydrochloric acid is used as the drug carrier, antituberculous drugs such as rifampicin can be effectively encapsulated. According to the relevant experimental results, the absorption efficiency of the elderly patients taking the drugs orally for one day is equivalent to the absorption efficiency of the drugs in the free state for 45 days. That is to say, further research and evaluation are needed to confirm whether the adverse event is caused by the target drug.

2.4 Signal verification

The formation of drug warning signals is to deal with the safety of drugs in time. The correlation between drugs and adverse reactions needs to be further verified. When the doctor clicks the button of saving prescription or checking prescription, the corresponding rules are triggered: the program collects the patient information and prescription information of the current prescription, and then retrieves the safe dose of the medicine from the Chinese medicine dose data table according to each linkage field that needs to be compared in the keyword data table. If the current system time is consistent with the set medication reminding time, the medication information will be broadcast by voice, and the system will display the medication information at the same time, and the user will be reminded by double sound and light to take the medication on time and quantity, and enter the medication judgment sub-process. The emphasis is to display abstract data intuitively by means of computer graphics and images for spatial data fields. For example, medical image processing, computational simulation data and data with spatial time series information, etc. In a sense, the early warning system can be regarded as a hub for collecting, processing and distributing various disaster information, and the ultimate goal is to provide reliable basis for the elderly to make various emergency decisions and take effective actions.

The main processing object of information visualization is non-spatial data. Nowadays, in the field of informatics research, the level of information visualization is generally applicable to the visual expression of structured and non-digital information resources. Its main task is to describe and analyze the causes and development trends of various identified unsafe phenomena, reveal the fluctuations and anomalies in the development process, and issue corresponding warning signals. Only when the operation nurse pays attention to the information on the reminder warning and clicks the "paid attention" button, the system will record the operator's name and execution time. Compared with data visualization, the key problem of information visualization is that it can effectively and intuitively display a large amount of abstract information in a relatively limited space, which makes information visualization need to change the visualization mode according to the needs of data, so that readers can understand the conveyed content efficiently. Compared with data visualization, the key problem of information visualization is that it can effectively and intuitively display a large amount of abstract information in a relatively limited space, which makes information visualization need to change the visualization mode according to the needs of data, so that readers can understand the conveyed content efficiently.

3. Applied Analysis

When the doctor gives orders or prescriptions, the early warning prompt of drug compatibility is given through the clinical pharmacy system. When the issued drug orders exceed the early warning value, they can be prompted and controlled. The doctor can determine whether the drug is within the restricted range and whether it is

over-prescribed according to the prompt information. Such as intravenous infusion of glucose drugs of various concentrations, which is used in large quantities and frequently, doctors will inevitably prescribe glucose drugs by mistake for elderly patients with diabetes or hyperglycemia in their busy work. If nurses fail to take good care of the drugs before use, it will lead to adverse events and even disputes between doctors and patients. Synchronization of medication records: send data synchronization instructions to the core control module, and receive real-time medication record data fed back by the core control module, which will be stored in the application directory in the form of files, so that users can query historical medication records at any time. According to the actual medical safety situation and potential unsafe factors, the medical safety early warning information room confirms the context signal after evaluating the medical safety coefficient. Establishing an early warning system of medical safety in the medical system can predict and alarm the occurrence of adverse medical safety events at an early stage, so as to take effective measures in time.

The information conditions faced by information visualization are more complicated than data visualization. In management activities, information visualization has no corresponding specific spatial characteristic information, and it is studied and analyzed in the form of visualization after being endowed with spatial information. According to the specific situation, it can continuously increase or decrease the target events of early warning, and has the ability of continuous adjustment and improvement; Complexity is mainly manifested in many aspects, such as the complexity of system monitoring objects, early warning indicators and early warning means; Information-based safe drug use warning system is beneficial for nurses to observe adverse drug reactions and disease changes. For example, every time nurses use digitalis and antiarrhythmic drugs to elderly patients, the warning words can remind nurses to monitor the heart rate of elderly patients, observe heart rhythm changes, and timely and actively find out whether the elderly patients have adverse drug reactions; It improves the safety management level of medication for elderly patients, reduces the blind medication and wrong medication when the department gives the doctor's advice, and assists some shortcomings in the actual operation through the eye-catching warning of drugs.

4. Summary

Early warning of safe drug administration is the focus of hospital safety management, especially the management of drugs. The information-based warning system for safe drug administration makes full use of computer information software, which makes the safety management of drugs more high-quality and efficient, and indeed ensures the accuracy, safety and treatment effect of medication for elderly patients. Relying on the doctor workstation program, nurse workstation program and drug dispensing program, the early warning control system of drug use realizes the control function of drug overuse, which provides auxiliary decision support for doctors to give orders, and also provides basis and help for the management and

monitoring of drugs in nurses' stations and pharmacies. It provides valuable construction experience for preventing and reducing the occurrence of drug safety incidents in the region and strengthening the information management of regional drug safety at present, and has good popularization value.

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