Research on Chinese Medicine Medication Device and Service Information System Platform

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Abstract. Decoction is a traditional form of Chinese medicine, and it has become one of the main dosage forms used in clinical practice due to its precise effectiveness and wide applicability. In order to achieve the best therapeutic effect, the method of taking the medicine at the optimal time is generally employed. However, for the elderly population, especially those with advanced age, it may be challenging for them to adhere to the scheduled medication due to their forgetfulness and inability to take the medicine on time. In this study, we address this issue by collecting various literature and conducting research on existing system platforms. We have designed and implemented a medication reminder service system using a medicine cup. This information platform primarily provides medication and decoction information through an app. The doctors and pharmacists input the information and generate a QR code for storage. This enables patients to easily access their medication and decoction information, reducing the probability of forgetting to take the medicine. Doctors no longer need to personally remind patients about medication timings, contraindications, and other related information. Therefore, this system improves patient satisfaction with medication adherence.

Keywords: Chinese medicine information platform; Timing of medication; Chinese medicine device

1. Introduction

According to 2019 data from the National Bureau of Statistics, China had 253.88 million people aged 60 and above, making up 18.1% of the population. Of these, 176.03 million were aged 65 and above, accounting for 12.6%. Older individuals often require periodic medication for their health, but they frequently forget or mistime their doses[1]. Smart medication systems like pillboxes and watches aim to address this issue. Smart voice pillboxes, typically designed as 4x3 compartments, can significantly improve medication adherence, ensuring correct timing and dosage. They can hold three days' worth of medication and allow for personalized scheduling by caregivers through voice input. Alarms and lights remind patients to take their meds, and compartments lock outside designated time periods to prevent errors[2].

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The IEZ Love Easy-Remember Smart Pillbox, developed by Shenzhen Yinjia Information Power Technology Co., Ltd., stands out as a comprehensive product in the market. It boasts a sleek design, portability, and six medication cups with sensors[3]. The pillbox connects to a smartphone app via Bluetooth, enabling users to set dosages and timing. It records medication times and generates a log after syncing with the app. This integrated approach promotes good medication habits[4].

Most electronic reminder devices for chronic disease management, both domestically and internationally, offer basic medication reminders and storage functions[5]. They lack remote monitoring or doctor supervision, hindering patient self-management[6].

Scholars have advanced technologies for Traditional Chinese Medicine (TCM) granules, including automatic encoding, contraindication databases, digitalized preparation records, QR-based delivery, a mobile client, and an information supervision platform[7]. This digitalized service system ensures traceability, contraindication alerts, reduced wait times, accurate deliveries, and a new way to supervise TCM decoctions. It saves time for hospital staff and patients, improves efficiency, enhances safety, supports treatment consistency, streamlines processes, and broadens decoction use[8]. Additionally, researchers have designed smart medication systems featuring timed reminders, medication configuration, mistake warnings, and data synchronization[9].

2. Basic Theory and Key Technology

The platform of Chinese medicine medication cup and service information system uses eclipse, HBuilder, and Android Studio as development tools, and JAVA and JavaScript as programming languages. Java has the characteristics of simplicity, object-oriented, distributed, robustness, security, platform independence and portability, multi-threading, and dynamism[10]. Java can be used to develop desktop applications, web applications, distributed systems, and embedded system applications, among others[11]. JavaScript (abbreviated as "JS") is a lightweight, interpreted or just-in-time compiled programming language that prioritizes functions. Although it is well-known as a scripting language for web development, it is also used in many non-browser environments. JavaScript is a dynamic scripting language based on prototype programming and supports a variety of paradigms, including object-oriented, imperative, and declarative (such as functional programming) styles[12].

2.1 CSS (Cascading Style Sheets)

CSS is a language that defines the structure of styles, such as fonts, colors, positions, etc. It is used to describe the formatting and display of information on web pages. CSS styles can be directly stored in HTML pages or in separate style sheet files. Regardless of the method, the style sheet contains rules that apply styles to specific types of elements. When using an external style sheet, the style sheet rules are placed in a separate document with a .css file extension. Style rules are instructions that can be applied to elements in a web page, such as formatting for text paragraphs or links. Style rules consist of one or more style properties and their values. Internal style sheets are placed directly in web pages, while external style sheets are saved in separate documents and linked to the web page using a special tag. The "cascading" in the name CSS refers to the way style sheet rules are applied to HTML document elements. Specifically,

the styles in a CSS style sheet form a hierarchy, where more specific styles override general styles. The priority of style rules is determined by CSS based on this hierarchy, creating a cascading effect[13].

2.2 MySQL Database

MySQL is an open-source relational database management system (RDBMS) that uses the most widely used database management language, Structured Query Language (SQL), for database administration. MySQL is open-source, which means that anyone can download it and modify it according to their personalized needs under the General Public License. MySQL is highly regarded for its speed, reliability, and adaptability[14].

2.3 QRCode

QR Code, also known as a two-dimensional barcode, was first created in Japan. It utilizes specific mathematical patterns distributed in black and white intervals in the X and Y directions to record data information. Unlike traditional barcodes, QR Code cleverly uses the concept of bitstreams from computer's internal logic. Through numerous mathematical figures similar to binary, it represents relevant text and numerical information. By utilizing optical scanners, the barcode can be automatically scanned and read, thereby enabling automatic data processing.

3. Function module design

This information system platform consists of a mobile App client and a web-based Web client. The web client provides medication and herbal decoction information for the App, which is entered by doctors and pharmacists and saved as QR codes. The mobile App client scans the generated QR codes to view medication and herbal decoction information.

The web-based Web client includes six modules: homepage, medication information, herbal decoction information, personal center, password modification, and contact us. Based on user professions, there are two types of users: doctor users and herbal pharmacists users. Doctors are responsible for entering and modifying medication information, while herbal pharmacists are responsible for entering and modifying herbal decoction information.

The mobile App client includes four modules: scanning QR codes, displaying QR code information, saving viewing records, and clearing browsing history.

3.1 Mobile App client

3.1.1 Mobile client Function modules

The functions of the Smart Medication Cup Mobile Client are shown in Fig.1.

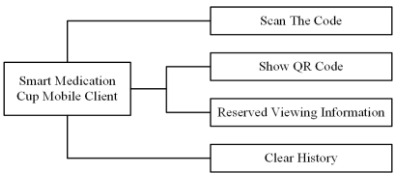

Figure 1 Smart Medication Cup Mobile Client Function

3.1.2 Mobile client interface

The core function interface of the smart medication cup mobile client is shown in Fig.2.

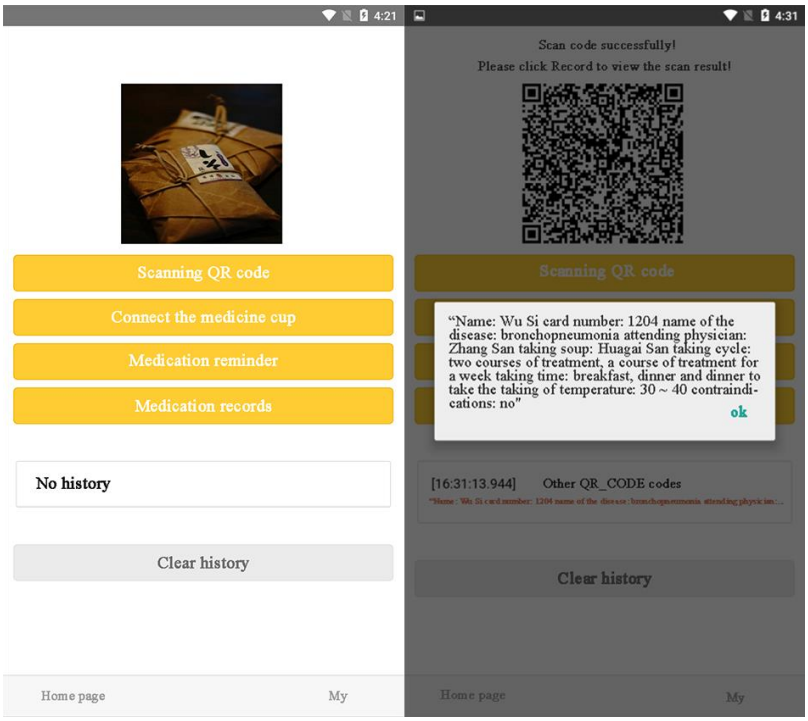

Figure 2 Smart Medication Cup Mobile Client Interface

3.2 Service Information System Platform

3.2.1 Service Information System Platform Function modules

The web-based Web client includes six modules: homepage, medication information, herbal decoction information, personal center, password modification, and contact us. The functions of the Service Information System Platform are shown in Fig.3.

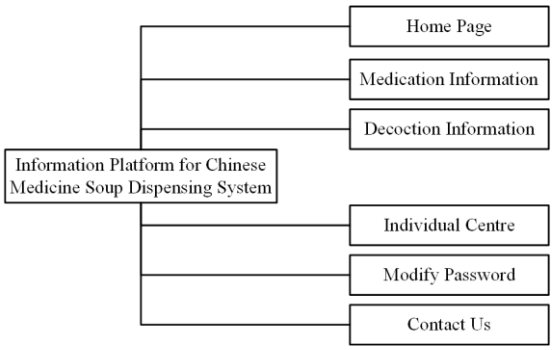

Figure 3 Service Information System Platform Functions

3.2.2 Service Information System Platform interface

The platform interface mainly utilizes master pages and subpages. The basic information of the logged-in user and the logout link are displayed in the bottom right corner of the title. Users can click the link to log out and return to the user login page. This link is displayed on every interface, allowing users to log out directly from any interface. Below the basic information is a navigation bar, where users can click on labels such as medication information, decoction information, user center, password modification, contact us, etc., to navigate to the corresponding pages.

The doctor user clicks on the medication information link to enter the medication information interface. This interface displays the card number, name, and registration time of the patient under the responsibility of the doctor user. The doctor clicks on the patient's card number to enter the prescription addition and modification interface. In this page, the doctor can modify or delete the original information, enter the medication cycle, temperature, time, and contraindications, and then click the "submit" button, which will prompt "Submit successfully!". After clicking the "generate QR code" button, the QR code will be displayed and the message "QR code generated successfully!" will be prompted, along with the path where the QR code is saved. The QR code file name is named after the patient's card number. This is shown in Fig.4.

Figure 4 Medication information interface

The pharmacist user clicks on the medication decoction information link to enter the medication decoction information interface. On the left side of the interface, there are the formula number and name for which the logged-in user is responsible. The pharmacist clicks on the formula number to enter the modification interface. They can enter the decoction time, temperature, equipment used, and the quantity of the decoction. After confirming that the information is correct, they can click on the submit button, and the system will prompt "Submit successfully!". By clicking on the "generate QR code" button, a QR code file named after the formula number will be generated.

4. Conclusions

This study designed and implemented a medication cup reminder medication service system to address the problem of elderly people having difficulty taking medication on time. The system collects literature and researches existing system platforms to provide patients with convenient medication and decoction information. By inputting information from doctors and pharmacists and generating QR codes for storage, patients can easily access medication and decoction information, reducing the probability of forgetting to take medication. At the same time, doctors no longer need to remind patients separately about medication times and contraindications, thus increasing patient satisfaction with medication compliance. The implementation of this system will help optimize the effectiveness of traditional Chinese medicine clinical medication, improve medication safety, and provide a more convenient and accurate medication management method for the elderly.

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