



Application of information management in commissioned decoction of Chinese Herbal Medicine in our hospital

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[Abstract] **Objective** We aimed to investigate the application of informatization in the quality management of Chinese herbal medicine decoction commissioned by hospitals, make the management more efficient, ensure the medication safety in patients, and increase patients' trust in the quality of commissioned decoction. **Methods** Using the hospital information system, informatization management was used in each link of the whole process, from doctor's prescription to patients' receipt of the commissioned decoction. **Results** The informatization transformation exceeded the information barrier among hospitals, patients, and commissioned decoction institution and has enabled pharmacists to handle the commissioned decoction more efficiently. The number of patients choosing commissioned decoction has significantly increased, whereas the number of complaints regarding the quality of the commissioned decoction immensely decreased. The comparative analysis of the data before and after informatization showed statistical significance ($P < 0.05$). **Conclusion** Informatization is an effective method for the quality management of commissioned decoction of Chinese herbal medicine.

[Key words] Commissioned decoction of Chinese herbal medicine; Informatization; Management

1 Introduction

Traditional Chinese medicine (TCM) has systematic theories. It has persisted up to this day and has made great contributions to the prosperity of the Chinese ethnicity. Since modern information technology develops rapidly, TCM service capacity should keep pace with the times. The combination of TCM and information technology has become an inevitable trend to enhance TCM service capacity. The informatization construction of TCM has its own particularity and complexity,

so the diagnostic and therapeutic characteristics of syndrome differentiation in TCM should be highlighted^[1].

Chinese herbal decoctions are characterized to have flexible prescription based on the symptom and rapid effect, reflecting the essence of syndrome differentiation and treatment in Chinese medicine. The decoction method has been valued by doctors of all dynasties. In his "Treatise on the Origin and Development of Medicine," Xu Lingtai, a famous doctor of Qing Dynasty, said "The decoction method should be studied in depth, since it determines the efficacy of the medicine" ^[2]. Nevertheless, the traditional decoction method is time consuming and

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laborious, and improper decoction may also affect the efficacy. In addition, the traditional decoction method cannot keep up with the rapid pace of modern life. Instead, commissioned decoction has been recognized and accepted by more and more people because it is cheap and convenient to carry and take and provides long shelf life in vacuum aseptic packaging. The development of commissioned decoction is the inheritance and development of the traditional decoction^[3].

Because space and manpower are limited, our hospital had always commissioned the decoction to a third-party decoction institution that had no video surveillance equipment networked to our hospital; hence, we could not supervise the quality of the decoction in real time. Data were transmitted by fax after being collected manually by a pharmacist, which is very inefficient. In addition, patients could not be duly informed of the drug status or tell how the medication is working, which is often inconvenient for doctors to make clinical decisions. The information barrier among patients, pharmacists, and doctors is disadvantageous for the doctor–patient communication.

In 2018, our hospital conducted a full investigation of patients, pharmacists, and doctors; achieved the interconnection of information through informatization transformation; and finally

developed a work model that offers more efficient pharmacist service, more convenient query for patients, and more timely information communication between doctors and patients. This model focused on informatization under the premise of information safety. Doctor's authorities were hierarchically managed and verified, and the data information involving patient's privacy was encrypted before being saved, to secure the information. An exclusive account with different authorities and identified by a password was assigned to each doctor according to their professional qualifications. The type of information that can be shared and the type that must be authorized for sharing were set hierarchically. The management model combines classified management and hierarchical authorization to achieve information sharing as well as patient privacy protection. Standard operating procedure (SOP) and informatization transformation were utilized by our hospital to design the pharmaceutical management service flowchart, as shown in Fig. 1^[4]. The key links, application effect, and experience are described below.

2 Refined classification of electronic prescriptions

After informatization transformation, the

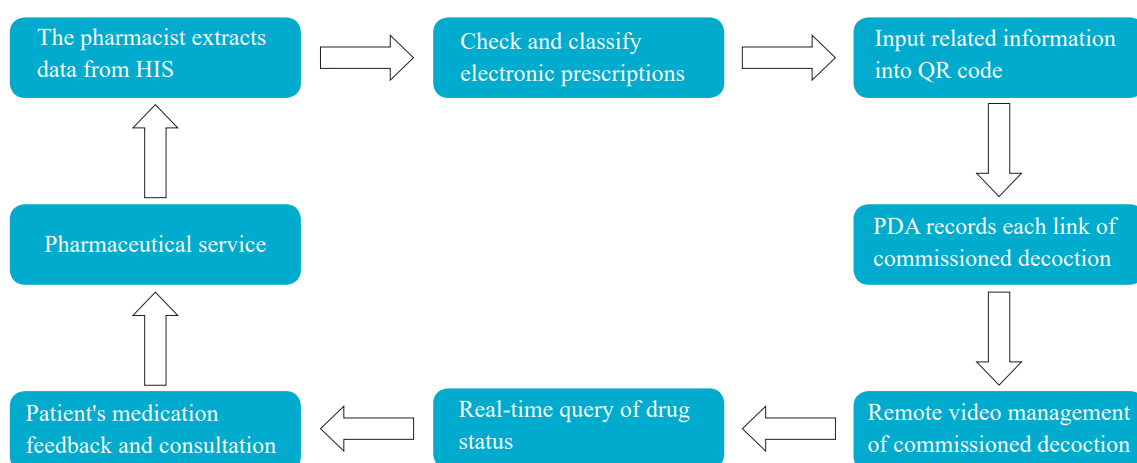


Fig. 1 Pharmaceutical management service flow chart designed using the SOP method

electronic prescriptions issued by doctors are transmitted to the pharmacy system terminal via the HIS system and classified automatically by the system according to different tags. Prescriptions with the internal dispensing tag will be automatically transferred to the pharmacy system and dispensed on the spot by the pharmacy department. Prescriptions with the commissioned decoction tag will be automatically transferred to the commissioned decoction system, checked and input by the pharmacist, and then transmitted to the commissioned decoction center in real time. The work efficiency has been significantly improved.

2.1 Creating QR code as an information carrier

Quick response (QR) code is the core module of management, and it is a very popular encoding method on mobile devices. It is highly fault tolerant, can hold large information, and can integrate encryption^[5]. Pharmacists input the prescription number, name, usage, specification, bed number, delivery address, and other information into the QR code; preset the soaking time and decoction time according to properties and therapeutic effects of the medicine; and then print out the prescription with QR code.

The QR code, used as an information carrier, has improved the efficiency and accuracy of data transmission.

2.2 Collection of the data of the entire process with PDA

Personal digital assistant (PDA) is used in each link of the commissioned decoction. The name, amount, and supplier of the Chinese herbal medicine, dispenser and reviewer of the prescription, and the start time of soaking, decoction time, packaging time, delivery time, responsible person, and other data will be recorded in the QR code via PDA. Patients can scan the QR code with the WeChat app for real-time query and accurate tracing, as shown in Fig. 2^[6-7].

3 Achieving remote video management through informatization transformation

In the past, the quality of the commissioned decoction was inspected once or twice a week with an unannounced follow-up factory inspection, such that the daily work of the commissioned decoction center could not be seen in real time. After informatization transformation, video monitoring probes can be found spread out in the dispensing room, decoction room, and packaging review room of the commissioned decoction institution, which provides the terminal service. The system synchronously sends the whole decoction process via video signals to the monitoring platform networked to the hospital. Pharmacists can monitor the entire process within doors. Informatization

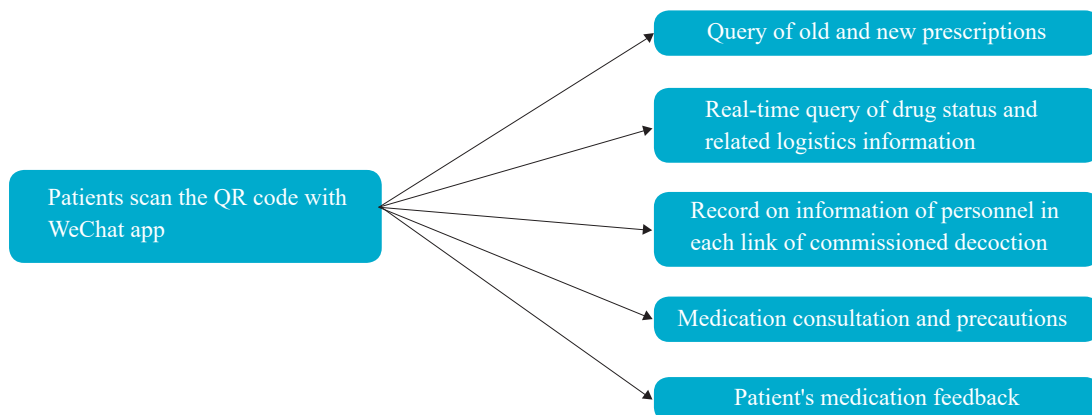


Fig. 2 Information available for patients by scanning QR code

brings a more standard, open, transparent, and efficient management model^[8].

4 Investigation and analysis on application effect after informatization transformation

4.1 Investigation method

4.1.1 Before informatization transformation

1 000 Chinese herbal medicine prescriptions were randomly extracted by the information system from each month between May and August 2018, and 357 commissioned decoction prescriptions were extracted. From the 357 prescriptions, 300 were randomly selected for the investigation of patients' satisfaction with the commissioned decoction conducted by our hospital's social service center through phone call follow-ups, based on the contact method on patients' health insurance card.

4.1.2 After informatization transformation

1 000 Chinese herbal medicine prescriptions were randomly extracted from the information system from each month between May and August 2019, and 460 commissioned decoction prescriptions were extracted. From the 460 prescriptions, 300 were randomly selected for the investigation of patients' satisfaction with the commissioned decoction conducted by our hospital's social service center by phone call follow-ups, based on the contact method on patients' health insurance card.

4.1.3 Content of patients' satisfaction with the commissioned decoction service

(1) Express service problems: Inability to deliver medication on time to patients' hands, unwilling to send upstairs, etc.

(2) Broken or leaking bags of the commissioned decoction

(3) Commissioned decoction pieces are delivered to the wrong patient, or some smaller packages are missing.

(4) Commissioned decoction pieces have quality problems, for instance, they become moldy in muggy weather.

(5) Information system error occurs between the hospital and commissioned institution. For instance, there may be missing data from data transmission during system maintenance and update, so the commissioned institution may not receive the electronic prescription of our hospital.

(6) Change in the number of times in which patients choose commissioned decoction once after informatization transformation.

(7) The number of times in which patients choose commissioned decoction again after informatization transformation.

4.2 Statistical method

Data were analyzed using SPSS 23.0. The χ^2 test was used to compare data before and after informatization transformation. The result of $P < 0.05$ was considered statistically significant.

4.3 Results

Regarding the number of times in which patients choose commissioned decoction once and again, the result from after informatization transformation was obviously better than that before informatization transformation, and the difference between the two groups was statistically significant ($P < 0.01$), as shown in Table 1. Regarding the quality of the commissioned decoction, three problems were found in every 300 prescriptions after informatization transformation, in comparison with 12 before informatization transformation. As shown in Table 2, significantly fewer quality problems were found after informatization transformation ($P < 0.05$)^[9].

5 Discussions

With the support of relevant national policies, TCM has been quickly developed, which brings not only significantly more dispensing work in pharmacy but also problems, such as inadequate pharmacy space, manpower shortage, and long waiting time for patients. The application of

Table 1 Comparison of the number of times in which patients choose commissioned decoction once and again before and after informatization transformation

Group	Total prescriptions	Number of times in which patients choose commissioned decoction	Proportion of total prescriptions /%	Number of times in which patients choose commissioned decoction again	Proportion to number of times in which patients choose commissioned decoction once/%
Before	1 000	357	35.7	312	87.4
After	1 000	460	46.0	452	98.3
χ^2		21.95		39.12	
<i>P</i>		<0.01		<0.01	

Table 2 Comparison of quality problems in service of commissioned decoction before and after informatization transformation

Group	Number of times in which patients choose commissioned decoction	Express service problems	Broken or leaking bags of commissioned decoction	Commissioned decoction pieces are delivered to the wrong patient, or some smaller packages are missing	Quality of decoction pieces	Information system error	Total quality problems	Proportion of quality problems /%
Before	300	3	2	3	1	3	12	4.0
After	300	1	1	1	0	0	3	1.0
χ^2							5.54	
<i>P</i>							<0.05	

informatization has optimized the work model of pharmacies and guided Chinese herbal medicine decoction in an intelligent direction. As of October 2019, the number of prescriptions sent to commissioned decoction institutions had increased significantly, whereas the complaint rate had significantly decreased. The informatization has shown dramatic effect and lowered the intensity of dispensing work; hence, pharmacists have more time to provide patients with more comprehensive medication consultation and guidance.

An informatization management team was set up by our hospital. It comprises personnel from the TCM department, pharmacy department, and information department. It participated in the entire process of informatization transformation, offered reasonable proposals on functional design and operation experience, and made the informatization transformation more efficient through multi-disciplinary cooperation. After the application of informatization, a comprehensive evaluation of the effect confirmed that informatization has

played an exceptional role in the management of commissioned decoction. The application of informatization has surpassed limitations of the insufficient space and manpower shortage of the hospital. In addition, the service capacity of TCM has been extended and enhanced to meet the diverse service requirements of patients. The feedback system has been established to ensure the quality of the commissioned decoction. Through informatization, pharmacists can trace each link of the commissioned decoction, which makes the quality management more transparent. For the commissioned decoction, the whole-process regulatory system has been established. The commissioned decoction institution has taken advantage of the information-based seamless connection with the prescription system; thus, the number of patients choosing commissioned decoction has increased significantly, and the institution has achieved its own development and expansion. The application of informatization has attained the intelligent management model

for commissioned decoction of Chinese herbal medicine, as well as the positive cycle among hospitals, patients, and commissioned institutions.

As internet technology continue to develop swiftly and artificial intelligence experiences continuous breakthroughs, informatization is becoming a leading force that guides the inheritance and development of TCM^[10-11]. China has set clear requirements for the informatization construction of TCM, which will play an increasingly more essential role in building a healthy China. The authors believe that informatization should be utilized to establish a medical data repository that focuses on electronic prescriptions and electronic medical records, as well as a perfect statistical system for TCM information. Attention should be paid to the information security. Patients should be provided with personalized, diversified, and high-quality TCM services.

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