## Original Article
# The effect of the information construction of traditional Chinese medicine in the personalized account of traditional Chinese medicine for cancer patients

Jia Li[1], Wei Wang[3], Xiang Li[1], Ting Li[2], Ruiting Hu[4]

*Departments of [1]Pharmacy, [2]Thoracic Medicine, Cancer Hospital of China Medical University, Liaoning Cancer Hospital & Institute, Shenyang, Liaoning Province, China; [3]Department of Pharmacy, Yantai Yuhuangding Hospital, Yantai, Shandong Province, China; [4]Department of Pharmacy, Ji'nan Jigang Hospital, Ji'nan, Shandong Province, China*

**Abstract:** Objective: We aimed to explore the effect of the informationization of traditional Chinese medicine by analyzing cancer patients' personalized accounts of traditional Chinese medicine. Methods: The patients' average waiting times, the error rates, the average times spent taking medicine, the incidence of medicine-related disputes, and the patients' medication accounts between the traditional method group (the control group, n=218) and the informationization medication account group (the observation group, n=232, in which all the information about the patients was obtained from the patients' dispensing entries) were analyzed and compared. Results: Compared with the traditional methods, the informationization medication account system reduces patients' average waiting times and average drug-taking times. And at the same time, the satisfaction with the medication account in the informational medication account system was significantly higher in the observation group than it was in the traditional method group (all P<0.001). In contrast, the error rate and the incidences of disputes regarding the medicine dispensing were significantly lower than they were with the traditional methods (all P<0.05). Conclusion: The informationization of traditional Chinese medicine improves the speed of dispensing medicine , reduces the waiting time, and decreases the medicine dispensing error rate for tumor patients, and improves the patients' satisfaction with their medication accounts at the same time, so it can be recommended for clinical application.

**Keywords:** Informationization of traditional Chinese medicine, cancer patients, medicine, satisfaction of account

## Introduction

Epidemiological investigations indicate that cancer is still the main disease leading to death, and it has become a major threat to the health and lives of the population [1-3]. Recent research shows that there are nearly 20 million new cancer patients worldwide resulting in more than 5 million deaths per year [4, 5]. China has the highest incidence rate of cancer. Data show that there were nearly 4 million new malignant tumors and about 2.338 million deaths in 2018 in China, accounting for almost half of the world's cancer deaths. It is clear that the prevention and treatment of cancer is a great challenge for public health [6-8].

At present, the main treatments for cancer are surgical resection, postoperative radiotherapy and chemotherapy, immunotherapy, and so on [9]. And the role of traditional Chinese medicine in the treatment of cancer is also gradually becoming well-known [10, 11]. More and more cancer patients choose Chinese medicine as an adjunct treatment for cancer [12]. The therapeutic effect of traditional Chinese medicine requires a detailed account by clinical pharmacists due to its inherent characteristics, including its many types, its precise amounts, and its preparation. The previous procedures mainly relied on the pharmacists to directly call the names of patients for analysis, and the dispensing in this manner had some disadvantages, such as low efficiency and high error rates. In addition, cancer patients have varying degrees of anxiety, depression, and other negative emotions, which eventually lead to ineffi-

ciency in the dispensing of traditional Chinese medicine and low satisfaction rates among patients [13, 14]. Recently, our center introduced the informationization account system of traditional Chinese medicine, which has significantly improved the dispensing efficiency, the total dispensing amount, and the patient satisfaction rate with the medication account, so we recommend it for the dispensing of traditional Chinese medicine. The report of our study is as follows.

## Materials and methods

### Clinical materials

218 patients who were subject to the non-computerized dispensing of traditional Chinese medicine by pharmacists at the Cancer Hospital of China Medical University, Liaoning Cancer Hospital & Institute from January 2018 to December 2018 were prospectively selected as the traditional method group, and 232 patients subject to informationization-based medication accounts from January 2019 to June 2019 were selected as the observation group.

Inclusion criteria: 1) Patients who took the medicine for the first time and who self-administered the medicine. 2) Patients older than 18 years. 3) Patients suffering from cancer.

Exclusion criteria: 1) Patients with speech dysfunctions. 2) Patients with hearing impairments. 3) Patients with previously-diagnosed neurological diseases. 4) Patients who were illiterate or who had only a primary school education.

All the patients were informed of the study and signed a written consent form. The study was approved by the Ethics Committee of the Cancer Hospital of China Medical University, Liaoning Cancer Hospital & Institute.

### Methods

*Traditional methods:* In the traditional method, the dispensing and accounting of traditional Chinese medicine by pharmacists is done mainly through calling machines, and which mainly includes: defining the name of the drug (in traditional Chinese medicine, it is common for one drug to have multiple names and for multiple drugs to have the same name), the processing methods of drugs (such as decocted first, take the drug following its infusion, decocted in a packet, special preparation of special drugs, and so on.), the medication time and the frequency, the incompatibilities of drugs in a prescription, dietary suggestions during medication, and so on. Due to the disadvantages of the machine, patients who missed their turn for various reasons need to take a new number.

*Informationization account system:* The combination of an informationization system with the number-calling and drug-taking system, and the completion of drug information can be viewed by the pharmacist after the dispensing is completed, and then the call system is used to complete the patient notification, reminding them to pick up the medicine on time. Once the drug has been dispensed, the information about it on the screen will be deleted. For the patients who had not taken their medicine in time, the information will be released and displayed with an unfinished state onto the invalid number screen in time. And the patients with invalid number needed to go to the passed-number windows to complete their drug collection. When compared with the previous mode of finding medicine by people, the above mode of finding people by their medicine through a unique prescription number, greatly reduces the occurrence of errors. In terms of drug accounts, a uniquely identifiable QR code with information about the patients' personal, prescription and medicine-taking data is created by the information system. The pharmacist obtains the patient's information through the machine to ensure the accuracy and completeness of the information. In addition, each patient's personalized account is formed through printing to form an accurate drug account, which will help to ensure the accuracy of the patients self-administering their medicines and the effectiveness of obtaining the required information.

### Evaluation methods

*Main outcomes:* According to the prescriptions reported by the pharmacy, the error rate of the two groups in drug dispensing was calculated by relevant professionals in the research group. In addition, the patients' average medicine-taking times were calculated based on the drug dispensing per unit time.

**Table 1.** Comparison of the general patient data between the two groups (n, $\overline{x}$ ± sd)

| Groups | Control Group | Observation group | t/χ² | P |
|---|---|---|---|---|
| Gender (male/female) | 110/108 | 123/109 | 0.201 | 0.654 |
| Age (years) | 57.8±5.8 | 58.4±6.0 | 1.036 | 0.302 |
| Education | | | 1.136 | 0.286 |
|    Middle and high school | 140 | 161 | | |
|    University and above | 78 | 71 | | |
| Type of disease | | | 2.575 | 0.442 |
|    Gastrointestinal tumors | 59 | 67 | | |
|    Respiratory system tumors | 71 | 83 | | |
|    Urinary system tumors | 43 | 44 | | |
|    Nervous system tumors | 45 | 38 | | |

**Table 2.** Comparison of the waiting times for medicine-taking between the patients in the two groups

| Group | n | Waiting time (min) | t | P |
|---|---|---|---|---|
| Observation group | 218 | 5.12±2.87 | 12.768 | 0.000 |
| Control group | 232 | 9.27±3.91 | | |

**Table 3.** Comparison of the average times for medicine-taking of the patients in the two groups

| Group | n | Waiting time (min) | t | P |
|---|---|---|---|---|
| Observation group | 218 | 8.09±2.96 | 9.763 | 0.000 |
| Control group | 232 | 11.47±4.23 | | |

*Secondary outcomes:* To investigate the patient satisfaction with the medication dispensing and to account for the differences between the two groups of patients, we used this formula: Satisfaction rate = (very satisfied + satisfied)/total number of cases * 100%. The average waiting time of medicine-taking and the incidence of disputes.

*Statistical analysis*

SPSS 20.0 statistical software was used for the analysis. The measurement data in accordance with a normal distribution were expressed as the mean ± standard deviation ($\overline{x}$ ± sd). Paired t-tests were used for the intra-group comparisons, and independent sample t-tests were used for the inter-group comparisons. The count data were expressed as number of cases

(percentage) (n, %), and chi-square tests were used for the comparisons, and P<0.05 indicated that a difference was statistically significant.

**Results**

*Comparison of general baseline data between the two groups*

There were no significant differences in the baseline clinical information between the two groups of patients in terms of gender, age, education, disease type, and so on, so the patients in the two groups were comparable (all P>0.05). The details are shown in **Table 1**.

*Comparison of the average waiting times for medicine patients in the two groups*

The results of this study showed that the average waiting time of patients in the observation group was significantly shorter than it was in the control group (5.12±2.87 min vs 9.27±3.01 min, P<0.001), suggesting that the information system can reduce the patients' waiting times. The details are shown in **Table 2**.

*Comparison of the average times for taking medicine between the two groups*

The results of this study showed that the average time for medicine-taking of the patients in the observation group was significantly shorter than it was in the control group (8.09±2.96 min vs 11.47±4.23 min, P<0.001), which preliminarily indicates that the information system can reduce the patients' medicine-taking times. The details are shown in **Table 3**.

*Comparison of the dispensing error rates in the two groups of pharmacists*

The results of this study showed that the dispensing error rate of pharmacists in the observation group was significantly lower than it was in the control group (11/232 vs 24/218, P<0.05), which preliminarily shows that the information system can reduce the dispensing error rate of pharmacists. The details are shown in **Table 4**.

**Table 4.** Comparison of the dispensing error rates of the patients in the two groups of pharmacists (n/%)

| Groups | n | Cases number of dispensing errors | Error rate (%) | $\chi^2$ | P |
|---|---|---|---|---|---|
| Observation group | 232 | 11 | 4.74 | 5.313 | 0.021 |
| Control group | 218 | 24 | 11.01 | | |

**Table 5.** Comparison of the satisfaction with the patient accounts in the two groups (n/%)

| Groups | n | Very satisfied | Satisfied | Dissatisfied | Satisfaction rate (%) |
|---|---|---|---|---|---|
| Observation group | 232 | 187 | 33 | 12 | 94.83 |
| Control group | 218 | 126 | 44 | 48 | 77.98 |
| $\chi^2$ | | | 26.163 | | |
| P | | | 0.000 | | |

**Table 6.** Comparison of the incidence of disputes among the patients in the two groups (n/%)

| Groups | n | The occurrence of disputes | Incidence of disputes | $\chi^2$ | P |
|---|---|---|---|---|---|
| Observation group | 232 | 8 | 3.45% | 6.142 | 0.013 |
| Control group | 218 | 21 | 9.63% | | |

*Comparison of the patient satisfaction in the two groups*

The results of this study showed that the patient satisfaction in the observation group was significantly higher than it was in the control group (P<0.001), which to a certain extent show that the information system improved the patients satisfaction with their accounts. The details are shown in **Table 5**.

*Comparison of the incidence of disputes experienced by patients in the two groups*

The results of this study showed that the incidence of disputes in the observation group was significantly lower than it was in the control group (P<0.05), which indicated that the informationization Chinese Medicine account system can significantly reduce the incidence of disputes in outpatient clinics. See **Table 6** for details.

## Discussion

With the development of tumor research, traditional Chinese medicine treatment has gra-dually gained attention from scholars at home and abroad in the treatment of cancer. The theory of traditional Chinese medicine emphasizes the determination of treatment based on pathogenesis obtained through the differentiation of symptoms and signs, exploring the ultimate causes and mechanisms, and adopts the treatment principle of breaking blood stasis and dispersing knots and supporting healthy energy. Combined with traditional radiotherapy and chemotherapy, it can improve the sensitivity of cancer patients to radiotherapy and chemotherapy, so as to improve the clinical treatment effect and reduce the adverse reactions of radiotherapy and chemotherapy, and finally obtain the clinical treatment expectation of prolonging life and improving patients' quality of life [15, 16].

In addition, traditional Chinese medicine also plays an important role in improving immune ability. Special studies have confirmed the role of immune function in tumor diagnosis and treatment, so traditional Chinese medicine plays an important role in the treatment of cancer [17, 18]. However, whether it is single traditional Chinese medicine, compound traditional Chinese medicine, or Chinese patent medicines, there are different processing methods, such as processing, decoction and so on. Therefore, the outpatient dispensing of traditional Chinese medicine is more complicated than it is in western medicine, and it is easy to make mistakes. It also causes conflicts between doctors and patients, and eventually affects the normal functioning of the hospital.

With the rapid development of information technology, it plays an important role in improving the efficiency of all aspects of healthcare, and with the further development of traditional Chinese medicine, the combination of information technology and traditional Chinese medicine has also become an important measure of the development of traditional Chinese medicine. In the past, the dispensing of traditional

Chinese medicine in outpatient clinics mainly depended on prescriptions and oral accounts, which had a certain error rate, a low efficiency, and low patient satisfaction. After introducing the information system, our center finally improved the efficiency of drug dispensing through refined drug differentiation, a personalized account system, and effective number handling measures. At the same time, the results of this study showed that the average drug-taking and waiting times of patients in the observation group were lower than those in the control group, indicating that the information system can improve the dispensing efficiency of outpatient traditional Chinese medicine pharmacies, which is consistent with the findings of previous studies [19].

The mis-dispensing of medicines can cause potential risks, especially since the prescriptions of traditional Chinese medicine are multi-component drugs, so this increases the error rates, and puts forward higher requirements for the outpatient medicine dispensing system at the same time. However,, the informatization system's standardized labeling of the prescription and its marks indicating the special treatment of special drugs greatly reduces the drug error rates. The results of this study also showed that the observation group had a lower error rate in taking drugs than the control group, which supports the conclusions of the previous studies [20].

Cancer patients themselves have the potential to experience adverse psychological emotions, and they are more prone to disputes than ordinary people and to affect the normal order of the hospital, so there are higher requirements for outpatient drug dispensing among the cancer patients in this special population [21]. When this study explored the impact of the information-based traditional Chinese dispensing system on the patients' account satisfaction and dispute rate, it was found that the degree of satisfaction among the patients in the observation group was higher than it was in the control group, and the incidence of disputes in the observation group was lower than it was in the control group. The potential mechanism may be explained by the fact that the information system can remind patients to focus on the key points by the detailed medication account, so as to increase the account sat-

isfaction. In addition, through an effective number processing system, the information system combined with a reasonable account system, ultimately reduces the incidence of disputes, and maintains the normal order of the hospital to a certain extent.

To sum up, based on the informationization of traditional Chinese medicine, the personalized accounts of traditional Chinese medicine in tumor patients can reduce the outpatient waiting time and drug-taking time of cancer patients, reduce the incidences of errors and disputes, and improve the account satisfaction of cancer patients. However, the system itself needs to be improved. In addition, the traditional Chinese medicine system does not connect traditional Chinese medicine with western medicine. There is also a compatibility problem, which is the next research step.

**Disclosure of conflict of interest**

None.

Address correspondence to: Ruiting Hu, Department of Pharmacy, Ji'nan Jigang Hospital, No. 21 Gongye North Road, Ji'nan 250101, Shandong Province, China. Tel: +86-15098813505; E-mail: huruiting21jg@163.com

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