Journal of Clinical and Nursing Research, 2025, Volume 9, Issue 8
http://ojs.bbwpublisher.com/index.php/JCNR
Online ISSN: 2208-3693
Print ISSN: 2208-3685

Analysis of the Effect of PDCA Cycle Combined with Information Technology on the Treatment Intervention of Chinese Herbal Medicines

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Abstract: *Objective*: To explore the effect of the PDCA cycle combined with information technology on the treatment intervention of Chinese herbal medicines. *Methods*: Traditional medication intervention was implemented from July 2022 to June 2023, and 57 patients who received Chinese herbal medicine treatment during this period were selected as the control group. The PDCA cycle combined with information technology was implemented from July 2023 to June 2024, and 56 patients who received Chinese herbal medicine treatment during this period were selected as the experimental group. Various indicators were compared between the two groups. *Results*: The total effective rate of the experimental group was higher, and the incidence of unreasonable prescriptions and adverse reactions was significantly lower than that of the control group. *Conclusion*: The combination of the PDCA cycle and information technology can improve the overall efficacy of Chinese herbal medicines, reduce the incidence of unreasonable prescriptions and adverse reactions, and ensure the safe use of Chinese herbal medicines. It is worthy of promotion and application.

Keywords: PDCA cycle; Information technology; Chinese herbal medicines; Safety Chinese library

Online publication: September 4, 2025

1. Introduction

Chinese herbal medicines have significant advantages such as efficacy, safety, and low cost, and have shown good results in the treatment of various diseases. However, with the expansion of the clinical application scope of Chinese herbal medicines, issues such as unindicated medication use, species confusion, and unreasonable compatibility have become increasingly prominent. Methods to ensure the safety and effectiveness of Chinese herbal medicine use are a key issue that needs to be addressed in medical institutions [1]. The PDCA cycle is a systematic, standardized, and professional evaluation measure developed for the treatment process of Chinese herbal medicines. It can timely identify and correct problems in medication regimens, thereby ensuring medication safety [2]. The PDCA cycle is a high-quality and comprehensive intervention method that covers four stages,

including planning and execution, and can continuously improve the quality of intervention to achieve established goals to the maximum extent. It has a wide range of applications and is considered a new method for the treatment intervention of Chinese herbal medicines. The Hospital Information System (HIS) is a relatively intelligent and efficient work system that can provide refined and targeted interventions for medication regimens of Chinese herbal medicines, thereby enhancing the safety of the treatment process and effectively promoting the service level of treatment intervention for Chinese herbal medicines. In this study, 113 patient samples receiving Chinese herbal medicine treatment in the hospital were selected to explore the implementation effect of the PDCA cycle combined with information technology.

2. Materials and methods

2.1. General information

This study explores the practical effects of combining the PDCA cycle method with information technology through a phased research approach. During the period from July 2022 to June 2023, when traditional medication intervention was implemented, 57 patients were selected as the control group. In the subsequent year when the PDCA cycle method was combined with information technology, 56 patients were chosen as the experimental group. The selected patient samples had clear disease diagnosis conclusions, were able to cooperate with the study, and the data content is shown in **Table 1**.

Table 1. Specific clinical data of two groups of patients

Group	Gender ratio (M:F)	Age range (years)	Mean age ± SD (years)
Test group (n=56)	31:25	33–65	50.08 ± 4.88
Control group (n=57)	30:27	34–68	50.14 ± 4.75
p-value	$P > 0.05$	$P > 0.05$	$P > 0.05$

2.2. Methods

The control group received traditional medication intervention: The pharmacist in the Chinese medicine dispensary only dispensed Chinese herbal medicine according to the medication plan, briefly informed patients about the mechanism and usage of each Chinese herbal medicine, informed them about common adverse reactions during medication and how to deal with them, and answered patients' questions. The experimental group implemented the PDCA cycle method combined with information technology:

2.2.1. PDCA cycle method

(1) Planning

The department head serves as the team leader, whose responsibility is to summarize intervention issues, deeply analyze the causes of the problems, and systematically formulate intervention strategies. Doctors and pharmacists are team members, responsible for summarizing patients' basic information, fully evaluating their treatment intervention needs, regularly providing feedback on patients' opinions, incorporating their correct views, and then reasonably optimizing the intervention content. Comprehensively evaluate common problems with Chinese herbal medicine treatment interventions, such as patients' insufficient understanding of the performance of Chinese herbal medicines, limited

awareness of medication plans, low cooperation in treatment with Chinese herbal medicines, and lack of understanding of standardized medication methods. Led by the team leader, all team members are organized to participate in a collective meeting, review the literature from the past five years, sort out typical cases within the department, list relevant points of Chinese herbal medicine treatment intervention in tabular form, and provide an intervention plan.

(2) Execution

The team leader carries out knowledge training activities, explains the key points of the rational use of Chinese herbal medicines, screens relevant procedures for Chinese herbal medicine treatment interventions, and strictly implements intervention work. Strengthen communication between doctors and pharmacists, jointly discuss issues related to Chinese herbal medicine treatment interventions, and formulate corrective measures. The team leader periodically evaluates the implementation of relevant measures and addresses any unreasonable aspects to ensure medication safety.

(3) Inspection

Following relevant procedures, the team leader regularly inspects the current status of interventions, focusing on evaluating whether the medication methods and dosages are correct. After summarizing any incorrect situations, they will be made public, relevant responsible persons will be identified, and material and spiritual punishments will be imposed. Those who perform well will be rewarded.

(4) Handling

When patients encounter medication problems, doctors and pharmacists will conduct group discussions to evaluate the underlying causes of the problems and provide solutions. Continuous improvement of the medication plan will be carried out, and deficiencies in intervention measures will be summarized weekly. The current problems will be included in the intervention targets of the next cycle to continuously improve the standardization of medication.

2.2.2. Information technology

(1) Regular assessment: According to relevant documents, regularly evaluate the current status of treatment with Chinese herbal decoction pieces at fixed times and locations each month. Evaluate information such as the drug name, drug dosage, rationality of use, dialectical medication, compatibility contraindications, and administration time of the medication plan. The evaluation content should be recorded in detail and comprehensively, and made public collectively within the department. The assessment results will be linked to the performance of the department staff.

(2) Classified monitoring: Under the guidance of the HIS system, pharmacists are responsible for monitoring the treatment costs and dosages of Chinese herbal decoction pieces, and screening for abnormalities. At the same time, evaluate the usage of expensive and fine decoction pieces as well as toxic decoction pieces, implement a real-time abnormal warning mechanism, and conduct dynamic monitoring of medication plans. If there is abnormal usage, it will be immediately stopped. Focus on evaluating the independent packaging status of high-value Chinese herbal decoction pieces to ensure their standardized use.

(3) Double-limit intervention: Multiple departments, such as the outpatient department, hospital clinic, and medical insurance office, will combine assessment results and the usage of Chinese herbal decoction pieces to establish control indicators for the average cost per visit for each department. Simultaneously, determine control indicators for the cost of Chinese herbs and the number of medicinal herbs used in

single-dose decoction pieces to carry out double-limit intervention. This aims to minimize the use of expensive decoction pieces and reduce the number of large prescriptions.

(4) Optimizing the system interface: Doctors and pharmacists log into their personal accounts in the HIS system and enter the relevant interface to inquire about the monthly medication plan for Chinese herbal decoction pieces. This allows them to grasp the pending medication plans and evaluate patient information, medication amounts, diagnosis results, and lists of Chinese herbal decoction pieces. The list of Chinese herbal decoction pieces includes information such as the course of treatment, the name of the decoction piece, usage dosage, method of administration, and type of decoction piece. The system enables team members to identify unreasonable situations based on evaluation results and provides reminders through pop-up windows. The pop-up window information includes the patient's age, name, visiting department, and diagnosis. If doctors have doubts about the medication plan, they can directly appeal on the system, point out reasonable reasons, and provide direct feedback to the team leader for a final decision.

2.3. Evaluation criteria

Compare the total effective rate (Marked effectiveness: symptoms disappear, no discomfort such as nausea and vomiting; Effectiveness: symptoms are relieved, mild discomfort such as nausea and vomiting; Ineffectiveness: no change in symptoms, severe discomfort), incidence of irrational drug use, and incidence of adverse reactions between the two groups.

2.4. Statistical method

SPSS 23.0 software was used to analyze the research data. Measurement data (±s) were tested using t-test, and count data (%) were tested using χ^2 test. $P < 0.05$ was considered statistically significant.

3. Results

3.1. Comparison of total effective rate data between the two groups

As shown in **Table 2**, the total effective rate of the experimental group was higher, with $P < 0.05$ between groups.

Table 2. Comparison of total effective rate between the two groups (n/%)

Group	Markedly effective	Effective	Ineffective	Total effective
Test group (n=56)	35	20	1	55 (98.21)
Control group (n=57)	30	20	7	50 (87.72)
χ^2				4.730
p-value				0.030

3.2. Comparison of irrational drug use incidence data between the two groups

As shown in **Table 3**, the incidence of irrational drug use in the experimental group was significantly lower than that in the control group ($P < 0.05$).

Table 3. Comparison of the incidence of irrational drug use between the two groups (n/%)

Group	Non-standard writing	Incompatibility	Inaccurate indication	Incorrect dosage	Unindicated use	Irrational medication rate
Test (n=56)	1	0	0	1	0	2 (3.6)
Control (n=57)	5	1	1	3	1	10 (17.5)
χ^2						6.862
p-value						0.008

3.3. Comparison of adverse reaction incidence data between the two groups

As shown in **Table 4**, the incidence of adverse reactions in the experimental group was significantly lower than that in the control group ($P < 0.05$).

Table 4. Comparison of the incidence of adverse reactions between the two groups (n/%)

Group	GI discomfort	Fever	Rash	ADR rate (%)
Test (n=56)	1	0	0	1 (1.8)
Control (n=57)	3	2	2	7 (12.3)
χ^2				4.729
p-value				0.029

4. Discussion

With the gradual deepening of pharmaceutical research, the advantages of traditional Chinese medicine in the treatment of various diseases have become increasingly prominent, and the types, prescriptions, and formulations of Chinese medicinal decoction pieces have increased significantly. At the same time, the problem of irrational drug use of Chinese medicinal decoction pieces has become increasingly prominent. The PDCA cycle method and information technology are effective methods to intervene in irrational drug use behaviors under the guidance of professional pharmacists, ensuring the effectiveness and safety of Chinese medicinal decoction pieces [3]. Among them, the PDCA cycle method is a relatively new intervention method that can evaluate the rationality of drug use plans in a planned and purposeful manner. Information technology can use the HIS system to comprehensively understand the drug use plan, screen out irrationalities, and then optimize them appropriately. The combination of the two can provide closed-loop intervention for drug use plans to prevent erroneous drug use plans through real-time monitoring. Moreover, combined intervention can prevent the abuse of expensive or toxic decoction pieces and maximize the safety of drug use plans [4]. Joint double-limit intervention can effectively control the cost of medication plans, thereby reducing the treatment burden on patients. Adding continuous quality improvement can enable the PDCA cycle method to generate a long-term optimization mechanism driven by data, ultimately improving the scientific nature of Chinese medicinal decoction piece treatment.

The results of this study show that the incidence of unreasonable prescriptions in the experimental group was significantly lower than that in the control group. The reason for this is that the PDCA cycle method can fully identify and screen out the core issues of Chinese herbal medicine treatment interventions in the planning stage,

such as contraindications or limited patient awareness. Then, by integrating classic cases and literature books, comprehensive and standardized intervention measures can be formulated [5]. In the execution stage, training activities can be used to strengthen the collaboration between doctors and pharmacists, and then measures such as dialectical medication or dose adjustment can be used to improve the intervention process and avoid human error. In the inspection stage, dynamic verification and intervention can be implemented on the rationality of the medication plan, and medication problems can be publicized. Combining rewards and punishments can continuously enhance the sense of responsibility of doctors and pharmacists, driving them to continuously improve their skills under the pressure of quality improvement. In the processing stage, the current medication plan problems will be summarized and made into the next cycle goal. The medication plan will be iteratively processed every week to achieve continuous optimization of the medication plan. Information technology can automatically assess the rationality of the medication plan, including the dosage and contraindications of Chinese herbal medicines, ensuring that the evaluation results are linked to the performance of the assessment. Classified monitoring can use the HIS system to provide real-time warnings of abnormal use of Chinese herbal medicines and timely intercept higher-risk medication plans. The dual management of the number of Chinese herbal medicines and their costs can prevent the abuse of herbal medicines. The control indicators are feasible, so the intervention quality is high. Pop-up reminders can promptly point out the inadequacies of Chinese herbal medicines, allowing doctors to appeal online and optimizing communication efficiency.

Information technology has the advantage of real-time monitoring, breaking the delay of manual auditing, and enabling early detection and handling of medication risks. Making the assessment results public can achieve data transparency, comprehensively summarize medication data, and facilitate efficient communication and healthy competition among multiple departments. Furthermore, the HIS system aligns with dialectical medication plans. The combination of the two can use the inspection and processing stages of the PDCA cycle method to identify problems, then use the HIS warning function to evaluate medication risks, and quickly revise the medication plan. The combination of the PDCA cycle method and information technology can improve intervention efficiency. The HIS system can be used to automate data collection operations, reducing the time required for manual verification in the PDCA cycle method. Moreover, under the rules of informatization, the PDCA cycle method can strictly control the quality of medication, ensuring high scientific and standardization levels. However, it should be noted that before implementing the PDCA cycle method and information technology, it is necessary to dynamically understand the patient's disease situation, summarize their basic information and diagnosis results, and fully utilize the intelligent advantages of the HIS system. The team leader can organize doctors and pharmacists to learn HIS system operation skills uniformly, refine the intervention process of the PDCA cycle method, and ensure that all intervention measures are clearly understood and mastered. This lays the foundation for the smooth implementation of Chinese herbal medicine treatment interventions.

In this study, the experimental group demonstrated better medication safety. The main reason is that during the treatment intervention process, pharmacists utilize their professional skills to strengthen the review and supervision of prescription content. This allows them to discover and appropriately handle related prescription issues promptly, ensuring the safety of patient medication. With the assistance of information technology, the efficiency of auditing and reviewing has increased significantly. This saves pharmacists more time for medication education activities and improves the quality of pharmaceutical services. Pharmacists proactively provide pharmaceutical counseling services to patients, explaining the mechanism of action, usage, and dosage of the medication plan. They also inform patients about lifestyle and dietary precautions during medication and patiently and meticulously answer

various questions raised by patients. This can avoid adverse drug reactions caused by individual patient factors [6].

5. Conclusion

In summary, the combination of the PDCA cycle method and information technology can reduce the incidence of unreasonable prescriptions and adverse reactions, ensuring the rational and safe use of Chinese herbal medicines. This approach is worthy of promotion and application. However, many aspects of this study are still incomplete, and further research is needed on the specific methods of the PDCA cycle and information technology.

Disclosure statement

The author declares no conflict of interest.

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