

Exploration of a Comprehensive Service Pathway for AI-Assisted Rational Clinical Use of Western Medicines

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Abstract: *Objective:* To analyze the application value of artificial intelligence (AI) in the comprehensive service pathway for rational clinical use of western medicines. *Methods:* A sample of 73 patients undergoing western medicine treatment from December 2024 to March 2025 was selected and divided into groups by lottery. Group A received AI-assisted management for rational clinical use of western medicines, while Group B received conventional management. Thirty-six patients taking oral western medicines were included in Group B. *Results:* Group A outperformed Group B in terms of the irrationality rate of western medicine usage, drug management scores, adverse reaction rates, complaint rates, and satisfaction levels, with $p < 0.05$. *Conclusion:* AI-assisted rational clinical use of western medicines enhances drug management quality, reduces the irrationality rate of medication usage, and decreases complaint rates related to western medicine usage.

Keywords: AI-assisted western medicine management; Rational use of western medicines; Safety of western medicines

Online publication: Nov 6, 2025

1. Introduction

The goal of rational use of western medicines is to enhance therapeutic efficacy, inhibit disease progression, promote disease recovery, and optimize patients' quality of life. Against the backdrop of rapid medical advancements, most medical scholars have shown increased attention and emphasis on pharmaceutical drug management.

Currently, western medicines are widely used in clinical treatment, and with the continuous enrichment of western medicine varieties, the difficulty of drug management has increased. However, it should be noted that some drugs have toxic effects, and irrational medication use can damage patients' liver and kidney functions, even increasing their mortality rate^[1].

Therefore, during the treatment of diseases with western medicines, it is crucial to minimize the toxic and side effects of western medicines, avoid adverse reactions that may cause further damage to patients' bodies, and ensure the safety of western medicine treatment. With the continuous maturation of AI technology, its gradual

application in medical services has accelerated the process of a new era of intelligent healthcare.

Pharmacy services are extremely important in medical services, and the introduction of AI technology can enhance the efficiency and optimize the quality of pharmacy services. This article explores the application value of AI in rational clinical use of western medicines by using a sample of 73 patients who took oral western medicines from December 2024 to March 2025.

2. Materials and methods

2.1. Materials

From December 2024 to March 2025, 73 patients undergoing Western medicine treatment were selected as samples and randomly assigned into groups by drawing lots. The baseline data of patients in Group A receiving Western medicine treatment were compared with those in Group B, with $p > 0.05$, as shown in **Table 1**.

Table 1. Baseline data analysis table for patients receiving western medicine treatment

Group	n	Gender (%)		Age (years)		Disease course (days)	
		Male	Female	Range	Mean	Range	Mean
A	37	19 (51.35)	18 (48.65)	32–61	46.91 ± 2.42	1–4	2.36 ± 0.25
B	36	18 (50.00)	18 (50.00)	33–61	46.88 ± 2.39	1–5	2.39 ± 0.27
χ^2/t		0.0133		0.0533		0.4928	
p		0.9081		0.9577		0.6237	

2.2. Inclusion and exclusion criteria

2.2.1. Inclusion criteria

- (1) Receiving Western medicine treatment
- (2) Providing informed consent
- (3) Having respiratory, digestive, urinary, circulatory, or nervous system disorders.

2.2.2. Exclusion criteria

- (1) Incomplete medical records
- (2) Critically ill patients
- (3) Patients at high risk of mortality.

2.3. Methods group

In the AI-assisted western pharmacy management model, several key functions are integrated to improve efficiency, accuracy, and patient safety.

First, AI-assisted prescription review utilizes a comprehensive drug database that integrates drug knowledge and usage instructions. By analyzing patients' allergy histories, comorbidities, and disease progression, the system enables automated prescription review, rapidly identifying potential drug interactions and dosage errors. This approach enhances the efficiency and accuracy of prescription verification, while licensed pharmacists, guided by AI alerts, prioritize high-risk patients for further inspection.

Second, AI-assisted dispensing streamlines the medication distribution process. After patients complete

their payment, billing information is transmitted to the pharmacy, where staff place medications into intelligent baskets. Patients verify their identity via an identification card on a display screen, after which the corresponding dispensing window flashes green, signaling accurate identity confirmation. Staff then dispense medications according to medical advice and advise patients to handle fragile or non-full-box items with care.

Third, AI-supported medication management employs a mobile supervision application that synchronizes prescription data, sends timely medication reminders for example before or after meals, and adjusts dosage recommendations based on patient factors such as age and weight through integration with electronic medical records.

In addition, western medicine consultation services are provided through a dedicated hotline and WeChat groups managed by professional pharmacists who address patient inquiries and offer personalized medication guidance. To further enhance service quality, process optimization ensures that problematic prescriptions identified during AI review are promptly returned to physicians for correction, thereby improving prescription rationality at the source.

Once verified, medications are dispensed efficiently to reduce patient waiting times, while pharmacists inform patients of precautions and provide consultation when necessary. Moreover, a quality supervision system is established to record and analyze patient, medication, and prescription data, allowing for continuous improvement of the database and regular assessment of pharmacy service quality.

Finally, pharmacy staff training is strengthened through regular online and offline sessions covering AI-assisted service principles, operational standards, and quality control requirements, ensuring all personnel possess the necessary professional knowledge and management skills. In contrast, Group B follows traditional procedures, dispensing medications based on prescriptions while verifying the types, quantities, and dosages of medications.

For special western medicines requiring additional precautions, pharmacists enhance communication with patients by verbally explaining relevant medication instructions.

2.4. Statistical research

Data processing was completed using SPSS 21.0, with percentages used to describe count data (χ^2 test) and mean $\pm$ standard deviation ($\bar{x} \pm s$) used to describe measurement data for western medicine treatment recipients (t -test). Significant differences were considered when $p < 0.05$.

3. Results

3.1. Unreasonable medication usage rate

The unreasonable medication usage rate among western medicine treatment recipients in Group A was 2.70%, which was lower than the 16.67% observed in Group B ($p < 0.05$), as shown in **Table 2**.

Table 2. Comparison of irrational drug use rates among patients treated with Western medicine (n, %)

Group	Improper medication method/dosage	Repeated administration	Antibiotic abuse	Improper combination therapy	Irrational medication rate
A (n = 37)	1 (2.70)	0 (0.00)	0 (0.00)	0 (0.00)	1 (2.70)
B (n = 36)	2 (5.56)	1 (2.78)	1 (2.78)	2 (5.56)	6 (16.67)
χ^2	-	-	-	-	4.1040
p -value	-	-	-	-	0.0428

3.2. Drug management quality score

The drug management quality score of Group A was higher than that of Group B, with $p < 0.05$. The details of the comparison of drug management quality scores for Western medicine were shown in **Table 3**.

Table 3. Comparison of drug management quality scores for Western medicine (n, %)

Group	Drug classification	Drug labeling	Drug storage location	Timely drug restocking	Drug shelf life
A (n = 37)	96.26 ± 2.16	97.18 ± 2.41	96.19 ± 2.44	97.26 ± 2.33	96.44 ± 2.11
B (n = 36)	91.44 ± 1.38	90.38 ± 1.49	92.68 ± 2.06	91.58 ± 1.58	90.36 ± 1.62
χ^2	11.3263	14.4525	6.6322	12.1567	13.7820
p	0.0000	0.0000	0.0000	0.0000	0.0000

3.3. Adverse reaction rate and complaint rate

The adverse reaction rate (2.70%) and complaint rate (0.00%) among patients treated with Western medicine in Group A were lower than those in Group B (16.67% and 11.11%, respectively), with $p < 0.05$. As shown in **Table 4**.

Table 4. Comparison of adverse reaction rates and complaint rates among patients treated with Western medicine (n, %)

Group	Fatigue	Gastrointestinal symptoms	Drowsiness	Skin rash	Incidence rate	Complaint rate
A (n = 37)	0 (0.00)	0 (0.00)	0 (0.00)	1 (2.70)	1 (2.70)	0 (0.00)
B (n = 36)	1 (2.78)	2 (5.56)	1 (2.78)	2 (5.56)	6 (16.67)	4 (11.11)
χ^2	-	-	-	-	4.1040	4.3494
p	-	-	-	-	0.0428	0.0370

3.4. Satisfaction

The satisfaction rate in Group A (97.30%) was higher than that in Group B (80.56%), with $p < 0.05$. As shown in **Table 5**.

Table 5. Comparison of satisfaction rates among patients treated with Western medicine (n, %)

Group	Satisfied	Basically satisfied	Dissatisfied	Satisfaction rate
A (n = 37)	30 (81.08)	6 (16.22)	1 (2.70)	36 (97.30)
B (n = 36)	19 (52.78)	10 (27.78)	7 (19.44)	29 (80.56)
χ^2	-	-	-	5.2411
p	-	-	-	0.0221

4. Discussion

Western medicine is an important method for treating diseases in modern medicine. Under the influence of factors such as a rich variety of drugs and combined medication, the efficacy of Western medicine has been significantly improved. Rational use of Western medicine can achieve ideal therapeutic effects. Through targeted and gentle

treatment, it can promote disease recovery, optimize the body's health status, and thereby enhance the patient's quality of life. In recent years, China's medical model has continuously improved, and the level of medical technology has developed rapidly, coupled with an increased emphasis on the safety of Western medicine use among patients^[2]. The rational and scientific of Western medicine use directly affect drug efficacy and patients' physiological health. If irrational use of Western medicine occurs, it can lead to increased medication risks and higher drug complaint rates. For example, the abuse of Western medicine can impair the body's repair function, making it difficult for patients to resist bacterial and viral infections. Another example is the irrational use of antibiotics, which can increase the risk of bacterial resistance.

Additionally, irrational combined medication can weaken or enhance the efficacy of drug components due to interactions between different drugs, and may even induce adverse drug reactions. Furthermore, the large-scale use of hormonal drugs can suppress organ function, increase the risk of endocrine disorders, and even lead to dependency on hormonal drugs. In addition, a high rate of irrational use or adverse drug reactions of Western medicine can also increase the risk of a negative social image for hospitals and even affect their revenue. As the variety of Western medicines continues to expand, they almost cover conservative treatment for all diseases^[3]. However, frequent and continuous use of Western medicines, influenced by the complexity of drug names, types, and dosage forms, often leads to incidents of irrational drug use, such as antibiotic abuse, improper routes of administration, and duplication of active ingredients. These issues compromise the efficacy of Western medicines and can lead to a series of complications, resulting in abnormal physiological health.

Irrational use of Western medicines can trigger medical accidents. Therefore, it is crucial to prioritize the management of Western medicines to ensure patient safety. Conventional Western medicine management is carried out in accordance with departmental procedures, emphasizing the rational use of Western medicines to reduce issues related to irrational drug administration. During modern drug management, the introduction of AI technology offers a new approach to Western pharmacy services. AI technology assists in the rational clinical use of Western medicines, eliminating the need for pharmacists to review prescriptions individually. This reduces the time required for pharmacist review and enhances the efficiency of Western medicine prescription audits. Consequently, pharmacists can dedicate more energy to pharmaceutical guidance, optimizing the overall pharmaceutical service quality in Western pharmacies^[4]. Furthermore, In the field of Western medicine, AI technology assists in ensuring clinical medication appropriateness. It integrates detailed patient medication information, including dosage, indications, and administration timing. By allowing pharmacists to input keywords and retrieve drug information rapidly, it streamlines the dispensing process and eliminates cumbersome manual data checks. During practical medication management, the system provides online responses to patient inquiries. For chronic patients in particular, AI facilitates remote services, encouraging medication adherence and improving the utilization of healthcare resources. Offering precise medication advice to patients helps avoid unnecessary drug regimen adjustments, thereby shortening the treatment cycle and enhancing overall clinical efficiency. Based on the data analysis in this article, AI-assisted services for the rational clinical use of Western medicines can reduce incidents of irrational drug use. By analyzing the causes, AI technology integrates drug information and clinical practice outcomes was observed, further enabling the rapid identification of irrational prescriptions or high-risk drug combinations that may lead to complications. For instance, patients taking anticoagulants and antibiotics simultaneously are at a higher risk of adverse events such as bleeding. With the introduction of AI-assisted services, drug interactions can be swiftly detected and identified, and irrational prescriptions can be flagged for licensed pharmacists. This enhances the efficiency of prescription review and helps prevent

complications in patients ^[5]. During the actual implementation of AI-assisted clinical rational drug use services for Western medicine, AI integrates patient case information and medication data, assessing liver and kidney function, etiology, and symptoms. It can accurately predict the metabolism and efficacy of Western drugs and, by analyzing relevant test results, calculate the optimal dosage. This effectively prevents adverse events such as thrombosis and bleeding. After physicians complete the prescription of Western drugs, the AI system immediately reviews the prescription, evaluating whether the route of administration, dosage, and frequency are abnormal, thereby reducing the prescription error rate. Additionally, by opening medication consultation hotlines and WeChat groups for medication management services, pharmacists can promptly address patients' medication concerns and guide them in proper drug use, ensuring patient medication safety ^[6]. Furthermore, some chemotherapy drugs require strict dosage control to avoid serious adverse reactions caused by incorrect dosages. The introduction of AI technology can enhance the management efficiency of high-risk and special drugs. Another set of data indicates that after implementing AI-assisted clinical rational drug use services for Western medicine, Group A achieved higher scores in drug management. Analyzing the causes, AI-assisted clinical rational drug was determined to integrate with clinical case data and hospital database information, further providing physicians with personalized drug administration services. For example, by searching keywords in the database, physicians can access information on similar past cases and receive recommended treatment plans, thereby improving diagnostic and therapeutic outcomes. During AI-assisted drug management, real-time and dynamic monitoring of patient condition fluctuations allows for the evaluation of treatment efficacy. Adjustments to medication regimens can be made based on patient feedback, further enhancing drug management scores. For instance, AI can adjust insulin dosage based on patients' blood glucose fluctuations to maintain stable blood glucose levels. Additionally, by opening medication consultation hotlines, setting up online consultation modules, and guiding patients to download apps, hospitals can provide intelligent medication supervision services, ensuring patients take the appropriate dosage of medication at the right time and preventing missed or incorrect doses ^[7].

Another set of data indicates that after the implementation of AI-assisted clinical rational drug use services for Western medicine, Group A experienced a reduction in adverse reaction events and complaint incidents. Analyzing the reasons, during the period of AI-driven intelligent services, it was possible to avoid factors that could lead to an increase in complications. Additionally, efficient medication adherence as per medical advice reduced the recurrence of primary diseases and alleviated the medical burden on patients, resulting in fewer complaint incidents during their intake of Western medicine. The final set of data shows that after the implementation of AI-assisted clinical rational drug use services for Western medicine, patients in Group A reported high satisfaction levels. Analyzing the reasons, AI determines drug dosages based on patients' actual physiological conditions, thereby avoiding the risks associated with high-dose medication that could increase drug reactions. This approach also reduces the waste of medical resources and subsequently lowers medical costs, leading to higher patient satisfaction. Furthermore, the introduction of AI technology has facilitated timely medication reminders, provided medication consultation services, and ensured medication adherence, thereby reducing instances of missed doses. As a result, patients are more satisfied with Western medicine services.

5. Conclusion

In summary, AI-assisted clinical rational drug use services for Western medicine can reduce incidents of irrational Western medicine use, improve drug management scores, minimize drug side effects, and result in fewer

complaints related to Western medicine treatment. Therefore, it is worthy of promotion.

Disclosure statement

The author declares no conflict of interest.

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