Journal of Multidisciplinary Healthcare

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

Constructing a Management Evaluation Index System Based on Hierarchical Analysis in the Interventional Therapy of Hematological Surgery in Hospitals

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Purpose: To construct a set of comprehensive, practical, scientific and reasonable management evaluation index system to provide strong theoretical support and practical guidance for improving the management level of interventional therapy of hematology surgery in hospitals.

Methods: A research team was set up at an early stage and a large amount of literature was consulted to construct a preliminary evaluation index system for the management of interventional therapy in the Department of Hematologic Surgery, which was modified and improved with two rounds of Delphi expert correspondence; at the same time, the weighting of the index system was analyzed by using the hierarchical analysis method. The reliability of the questionnaire was evaluated by using the Cronbach's alpha coefficient, a measure of correlation and internal consistency, on 100 patients receiving interventional therapy.

Results: The final evaluation index system of interventional therapy management in hematologic surgery includes 5 first-level indexes, 18 second-level indexes, and 41 third-level indexes; the Cronbach's α of all the first-level indexes is >0.7.

Conclusion: The scientific, reliable, and practicality of the index system of interventional therapy management in hematologic surgery is high, and it provides a relevant basis for the continuous improvement of interventional therapy in hematologic surgery in the future. It provides a relevant basis for the continuous improvement of hematology surgery interventional therapy in the future.

Keywords: hierarchical analysis, hematologic surgery, interventional therapy, indicator construction

Introduction

Interventional therapy is a minimally invasive and highly effective therapeutic means, which is increasingly widely used in the clinical treatment of various blood diseases.[1] It has brought new hope to many patients by virtue of its precise localization, small trauma, and relatively short recovery period, significantly improving patients' quality of life and increasing the survival rate.[2] However, the complexity of interventional therapy and the high demands on the professional competence of the medical team, equipment resources, and management of the treatment process make it a key challenge for hospitals to ensure the safety and effectiveness of the treatment process and to improve the overall management level.[3]

Evaluating the management quality of interventional therapy scientifically and reasonably can help identify potential risks in the treatment process, optimize the allocation of resources, improve the efficiency of medical staff, and enhance the hospital's ability to serve patients.[4] At present, the evaluation system for interventional treatment management in hematology surgery often focuses on a single dimension and lacks integrated evaluation of medical resource utilization and team collaboration; Part of the system relies on subjective scoring, with insufficient quantification.[5–7] Although hospitals are investing more and more in the hardware facilities and technical applications of interventional therapy, there

Received: 17 May 2025
Accepted: 27 August 2025
Published: 18 September 2025

are still many deficiencies in the construction of the management evaluation system, and there is a lack of a comprehensive, systematic, and targeted evaluation index system to accurately measure the effectiveness of management. As a multi-criteria decision-making method that combines qualitative and quantitative analysis, the Analytic Hierarchy Process (AHP) is able to effectively deal with the judgment of the relative importance of factors in complex problems.[8] By constructing a hierarchical model, a complex management problem is decomposed into constituent factors at different levels, and the weights of the factors are determined by two-by-two comparison, thus providing a scientific basis for decision-making.[9]

In view of this, this study aims to use hierarchical analysis to deeply analyze the key links in the management of interventional therapy of hematology surgery in hospitals, and to construct a set of comprehensive, practical and scientifically reasonable management evaluation index system, with a view to providing strong theoretical support and practical guidance for improving the management level of interventional therapy of hematology surgery in hospitals.

Methods and Data

Establishment of the Research Team

The survey invited 18 experts in related disciplines to construct the indicators, including 4 hematological surgeons, 4 surgeons, 8 experts in nursing management, and 2 postgraduate students in hematological surgery. The average working experience of the experts was 13.15±6.12 years. In the initial stage, the research team participated in the formulation of the management evaluation index system in hematologic surgical interventions in combination with clinical experience, and mainly referred to the Proposed diagnostic criteria for classical chronic myelomonocytic leukemia (CMML), CMML variants and pre-CMML conditions.,[10] "Leukopenie - ein diagnostischer Leitfaden für die Praxis [Leukopenia - A Diagnostic Guideline for the Clinical Routine]",[11] "Practical approach to the management of catheter-related bloodstream infection",[12] and "Interventional Radiology. Indications and Best Practices"[13] to refine and score the index system. Meanwhile, at the reference and scoring stage, suggestions can be provided for changing the elements to further improve the whole index system.

Literature Search Strategy

Computerized searches of PubMed, Web of Science, the Cochrane, Library, EMbase, China Knowledge Network, Wanfang Database, China Biomedical Literature Database and guidelines websites such as Medical Pulse, National Institute for Health and Care Excellence (NICE), the Guidelines International Network (GIN) and other guideline websites. The search terms were: Hematologic Surgery/Hematologic/Interventional Therapy/Evaluation/Systems/Evaluation/Systems Vascular Interventions/Non-Vascular Interventions/Management/Hospital Management. A literature search was conducted using a combination of subject terms and free words with a timeframe of building the library until April 8, 2025. The research team used the retrieved literature to initially formulate a system of indicators for evaluating management in hematologic surgical interventions.

Expert Correspondence

The extracted indicators were summarized and organized, and a preliminary system of management evaluation indicators in hematological surgery interventions was formulated, and an expert correspondence questionnaire was developed. The questionnaire consists of three parts: 1) a preamble; 2) a questionnaire for experts to assess the necessity, importance, achievability, and comprehensibility of each element of the survey using the Linkert 5-point scale (1=strongly disagree, 2=disagree, 3=undecided, 4=agree, and 5=strongly agree); and 3) a questionnaire on the situation of the experts. Purposive sampling method was used to select correspondence experts nationwide. Inclusion criteria for correspondence experts: undergraduate education or above; intermediate or above title; more than 10 years of experience in surgery in a tertiary hospital; more than 3 years of experience in direct care or management of hematological surgery patients; voluntary participation in the study, and the ability to complete the correspondence questionnaire within a specified period of time. The experts were invited by telephone before the questionnaire was distributed, and after the experts agreed, the researcher sent the questionnaire by e-mail. After each round of correspondence, the researcher conducted statistics and discussions on the results of the correspondence, using the mean value ≥ 4.0 points and coefficient of variation (CV) and lt; 0.25 as the criteria for the screening of indicators, and then the research team focused on the discussion of expert opinions after the collation of experts' opinions, and the correspondence was terminated when the experts' opinions were basically the same. A total of 2 rounds of expert correspondence were conducted in this study.

Study Subjects

Convenience sampling method was used to investigate 100 patients who received interventional therapy from April 2024 to April 2025 in the Department of Hematological Surgery of the Second Affiliated Hospital of Wenzhou Medical University. The data collection stage adopts a single blind method: the evaluator is unaware of the patient's clinical information and only scores based on objective indicators; During the expert consultation stage, anonymous scoring of indicator weights is used to avoid group bias. This study has been reviewed and approved by the Ethics Committee of the Second Affiliated Hospital of Wenzhou Medical University (Wenzhou, Zhejiang Province, China), Patients or family members were informed and agreed.(Approval No.:).

Inclusion criteria: (1) reference to the literature "The main progresses and hot spots of hematological diseases in the past decade"[14] patients were diagnosed with blood diseases by clinical symptoms, laboratory tests and imaging examinations; (2) according to the patient's condition, it was clearly required to receive interventional therapy by the hematological surgery department and related departments. (2) According to the patient's condition, after consultation and evaluation by experts from the Department of Hematology and related departments, it is clear that the patient needs to receive interventional therapy as the main treatment or part of the comprehensive treatment; (3) It is the first time to receive interventional therapy of hematological surgery, and has not received similar interventional therapy programs for this disease; (4) The patient and his/her family members have signed an informed consent form. Exclusion criteria: (1) the existence of vital organ function problems; (2) the combination of psychiatric diseases; (3) communication barriers, unable to understand the meaning of the indicators. The patients and their families were aware of and agreed to the general information in Table 1.

Statistical Methods

SPSS 27.0 and R4.4.2 were used for data processing. The coefficient of variation (CV) and Kendall's coefficient of concordance (KW) were used to measure the level of agreement between expert opinions. The coefficient of expert authority (Cr) was calculated as the average of the coefficient of judgmental basis (Ca) and the coefficient of familiarity (Cs), and a hierarchical analysis was performed using the R language psych package; the Cronbach's alpha coefficient was used to evaluate the credibility of the indicator system. Counts were expressed by their frequencies and percentages, while quantitative data were expressed by mean ± standard deviation, with P < 0.05 indicating significant differences.

Results

Results of Expert Correspondence

A total of 28 experts, aged 35.34 ± 6.78 years, with 10.65 ± 6.76 years of working experience, from 19 tertiary hospitals and above across China were included in this study. Among them, 8 were doctoral students, 14 were master's students, and 6 were undergraduates. 31 questionnaires were distributed in both rounds of correspondence, and 28 valid questionnaires were recovered, with the effective recovery rate of both questionnaires being 90.32%. In the first round of correspondence, 15 experts (53.57%) put forward modification opinions, and in the second round of correspondence, 5 experts (17.86%) put forward modification opinions, which shows that the degree of authority of the experts is high. The

Table 1 General Information

Age (Years)	Disease Duration (Years)	Education			Gender	
		Elementary or Middle School	High School	College and Above	Male	Female
73.37±5.14	6.37±3.24	23	32	45	61	39

coefficient of authority of experts in the first round of correspondence is 0.8289, and the coefficient of authority of experts in the second round of correspondence is 0.9039, so the results are credible. Meanwhile, the Kendall's coefficient of the first round is 0.560, and the Kendall's coefficient of the second round is 0.536, with P<0.001, the Kendall's harmonization coefficient is good, and the credibility is high.

Experts' Modification Opinions

Results of the first round of expert consultation: After the first round of expert consultation, 15 experts proposed modification opinions, and after discussion by the research group, the third-level indicator "Comparison of the cure rate with the average level of the same industry in China" was added to the second-level indicator "Cure rate". The secondary indicator "recurrence rate" is subdivided into "short-term recurrence rate", "medium-term recurrence rate" and "long-term recurrence rate". The secondary indicator "recurrence rate" is subdivided into "short-term recurrence rate", "medium-term recurrence rate", and "long-term recurrence rate"; the secondary indicator "stock turnover of medicines" is added under the primary indicator "medical resources", and subdivided into the tertiary indicators "commonly used" and "high-value". "High-value". Results of the second round of expert consultation: After the second round of expert consultation, a total of 5 experts proposed modifications. Based on the experts' opinions and group discussions, the indicators were modified as follows: "Incidence of postoperative infections" was modified to "Incidence of interventional infections".

Constructing the Indicator System

The final indicator system includes 5 first-level indicators, 18 second-level indicators and 41 third-level indicators for the evaluation of the management of interventional therapy in hematological surgery, and the distribution and weights of the specific indicators are shown in Table 2.

Table 2 Evaluation Index System for Management of Haematological Surgical Interventions

Primary Indicators	Secondary Indicators	Tertiary Indicators		Weights	Combination Weights
Treatment effect				0.306	
	Cure rate			0.0553	0.0169
		Different types of diseases	Statistics on the cure rate of different types of diseases;	0.3167	0.0054
		Patients of different age groups	Analysing the cure rate of patients of different age groups	0.3032	0.0051
		Comparison with the national average of the same sector	Comparing the hospital's cure rate with the national average of the same sector	0.3801	0.0064
	Effective rate			0.0621	0.019
		Symptom relief rate	Counting the number of patients whose main clinical symptoms have been significantly relieved after intervention as a proportion of the total number of patients treated;	0.3652	0.007
		Haematological indexes improvement	Calculating the proportion of patients whose key haematological indexes have reached the normal range after treatment or have been significantly improved compared with the pre-treatment period;	0.4003	0.0076
		Improvement of imaging indexes	Counting the number of patients whose imaging indexes have been improved as a proportion of the total number of patients;	0.2345	0.0045
	Relapse rate			0.0482	0.0148

(*Continued*)

Table 2 (Continued).

Primary Indicators	Secondary Indicators	Tertiary Indicators		Weights	Combination Weights
		Short-term	The proportion of patients whose disease relapses within 1 year after intervention to the number of patients who have received treatment and reached the criteria of clinical cure or stable condition during the same period Short-term	0.3333	0.0049
		Intermediate	The proportion of patients with disease recurrence within 1–3 years after treatment;	0.3333	0.0049
		Long-term	The proportion of patients with disease recurrence after 3 years of treatment;	0.3333	0.0049
Complications				0.0717	0.0219
		Intra-operative	The number of patients with complications during interventional procedures as a proportion of the total number of patients who underwent interventional procedures during the same period of time;	0.3333	0.0073
		Post-operative	The number of patients with complications during post-operative; Post-improvement. Postoperative 1 In the immediate postoperative period	0.3333	0.0073
		In the distant postoperative period	The proportion of patients who developed distant complications such as wound infection	0.3333	0.0073
Medical Safety				0.3	0
Surgical Error Rate				0.0834	0.025
		Critical Operations	The number of errors in critical interventional operations as a percentage of the total number of operations;	0.4875	0.0122
		Programme Deviation	Comparing the actual surgical operations with the established surgical programme and calculating the ratio of the number of surgical operations in which there was a deviation from the programme to the total number of surgical operations;	0.5125	0.0128
Incidence of Infection				0.0396	0.0119
		Surgical Incision Infections	The number of cases in which patients' surgical incisions were infected after interventional operations as a percentage of the total number of patients who had undergone the operations during the same period of time	0.4925	0.0059
		Device infections	Percentage of patients with infections caused by devices used in interventions;	0.5075	0.006
First aid measures				0.0468	0.014
		Equipment	The rate of first aid equipment being in good condition;	0.4567	0.0064
		Medications	The rate of effectiveness of first aid medications;	0.5433	0.0076
Service quality				0.2	0
Satisfaction				0.0585	0.0117
		Patient satisfaction	Statistics on patient satisfaction with haematological surgery	0.4003	0.0047
		Medical and nursing staff satisfaction	Patient satisfaction with medical and nursing staff in the process of treatment	0.3125	0.0037
		Environment	The degree of satisfaction of patients with the environmental factors of the hospital interventional treatment area	0.2872	0.0034
Adequate communication				0.0469	0.0094
		Surgical risk notification	The medical and nursing staff to inform the patient and his family of the possible risks of surgery in a comprehensive manner;	0.3821	0.0036

(*Continued*)

Table 2 (Continued).

Primary Indicators	Secondary Indicators	Tertiary Indicators		Weights	Combination Weights
		Patient's questions and answers	The degree of satisfaction of the patient with the answers to their questions	0.6179	0.0058
Follow-up				0.0772	0.0154
		Telephone	Postoperative follow-up of patients by telephone	0.5	0.0077
		Online	Follow-up through online healthcare platforms	0.5	0.0077
Feedback handling				0.0331	0.0066
		Response	Probability of responding to patients' complaints	0.5	0.0033
		Resolution	Appropriate resolution of patients' complaints and acceptance by patients	0.5	0.0033
Medical resources				0.1	0
Equipment use				0.0418	0.0042
		Core equipment use	The ratio of actual time spent on patient examinations and interventions to the theoretical operating time of the equipment	0.525	0.0022
		Interventional device single use	The ratio of actual time spent on interventional devices to the standard time spent on interventions	0.475	0.002
Bed turnover				0.0527	0.0053
		Average number of days of patients' stay in hospital	The average length of stay of patients admitted to interventional therapy from admission to discharge	0.5689	0.003
		Recovering patients' turnover	The turnover of beds of patients in recovery from interventions Bed turnover of patients who have completed an intervention and are recovering from it	0.4311	0.0023
Workload				0.0693	0.0069
		Doctors' consultation hours	The number of hours per day that doctors actually see patients related to interventions	0.5137	0.0036
		Nurses' working hours	The number of hours per day that nurses work in haematosurgery	0.4863	0.0034
Stock turnover of medicines				0.0766	0.0077
		Frequently used	The number of times commonly used medicines for interventions are moved in and out of stock in a given time period	0.5311	0.0041
		High-value	The number of times higher-priced consumable interventional products are moved in and out of stock in a given period of time	0.4689	0.0036
Teamwork				0.1	0
Mutual evaluation of medical and nursing staff				0.0815	0.0082
		Smoothness of communication	Medical and nursing staff evaluate each other to see if communication with each other is smooth during daily work and interventional treatment	0.5907	0.0048
		Problem cooperation	The positive degree and effect of cooperation between medical and nursing staff in solving problems	0.4093	0.0033
Timely consultation				0.0344	0.0034
		Emergency consultation	The number of times that specialists in haematological surgery arrive at the place of consultation within 30 minutes	0.5	0.0017
		Routine consultation	The haematological surgery specialist completes consultation within 24 hours	0.5	0.0017
Collaborative projects				0.0699	0.007

(*Continued*)

Table 2 (Continued).

Primary Indicators	Secondary Indicators	Tertiary Indicators		Weights	Combination Weights
		Completion of the project on time	In accordance with the scheduled research plan. Completed on time according to the scheduled research plan Ratio of the number of joint projects with other departments to the total number of research projects	0.6742	0.0047
		Joint treatment of complex cases, Ratio of the number of cases of complex haematosurgical interventions successfully cured by multidisciplinary collaborative treatment to the total number of complex cases		0.3258	0.0023

Importance Scores

The importance scores and coefficients of variation of the evaluation system of haematological surgical interventional therapy management are shown in Table 3.

Table 3 Importance Score of the Evaluation System of Haematological Surgical Intervention Management

	Indicator Score	Variance	Coefficient of Variation
Cure rate of different disease types	4.53±0.502	0.252	0.05
Cure rate of patients of different age groups	4.51±0.502	0.252	0.05
Comparison of cure rate with the average of the same industry in China	4.48±0.502	0.252	0.05
Symptom relief	4.46±0.501	0.251	0.05
Improvement of haematological indexes	4.58±0.496	0.246	0.05
Improvement of imaging indexes	4.59±0.494	0.244	0.049
Short-term	4.51±0.502	0.252	0.05
Intermediate	4.55±0.5	0.25	0.05
Long-term	4.47±0.502	0.252	0.05
Intra-operative	4.43±0.498	0.248	0.05
Post-operative near-term	4.45±0.5	0.25	0.05
Post-operative longterm	4.45±0.5	0.25	0.05
Critical operation	4.52±0.502	0.252	0.05
Deviation of programme implementation	4.44±0.499	0.249	0.05
Infection of surgical incision	4.5±0.503	0.253	0.05
Infection of instruments	4.53±0.502	0.252	0.05
Equipment	4.48±0.502	0.252	0.05
Drugs	4.51±0.502	0.252	0.05
Patient satisfaction	4.44±0.499	0.249	0.05
Healthcare personnel satisfaction	4.54±0.501	0.251	0.05
Environment	4.51±0.502	0.252	0.05
Surgical risk notification	4.41±0.494	0.244	0.049
Patient query answering	4.51±0.502	0.252	0.05
Telephone xml-ph-002 Core equipment use	4.47±0.502	0.252	0.05
Single use of interventional devices	4.39±0.49	0.24	0.049
Average patient days in hospital	4.51±0.502	0.252	0.05
Patient turnover in recovery	4.47±0.502	0.252	0.05
Physician intake	4.54±0.501	0.251	0.05
Nurse hours	4.43±0.498	0.248	0.05
Frequently used	4.41±0.494	0.244	0.049

(*Continued*)

Table 3 (Continued).

	Indicator Score	Variance	Coefficient of Variation
Highly valued	4.45±0.5	0.25	0.05
Communication fluency	4.54±0.501	0.251	0.05
Problem co-ordination	4.39±0.49	0.24	0.049
Emergency consultation	4.52±0.502	0.252	0.05
Routine consultation	4.5±0.503	0.253	0.05
Completed on time	4.48±0.502	0.252	0.05
Combined treatment for complex cases	4.53±0.502	0.252	0.05
Cure rate of different disease types	4.53±0.502	0.252	0.05
Cure rate of patients of different age groups	4.52±0.502	0.252	0.05
Comparison of cure rate with the average of the same industry in China	4.5±0.503	0.253	0.05
Symptom relief	4.5±0.503	0.253	0.05

Correlation Analysis

The management evaluation index system in haematological surgical interventions was implemented in 100 patients and the correlation of patient scores is shown in Figure 1.

Reliability Analysis

The Cronbach'α coefficient was used to indicate the reliability of the index system of patients' evaluation of management in haematological surgical interventions, and the Cronbach'α of all the level 1 indexes were > 0.7, indicating that the index system had high reliability ($P < 0.05$), see Table 4.

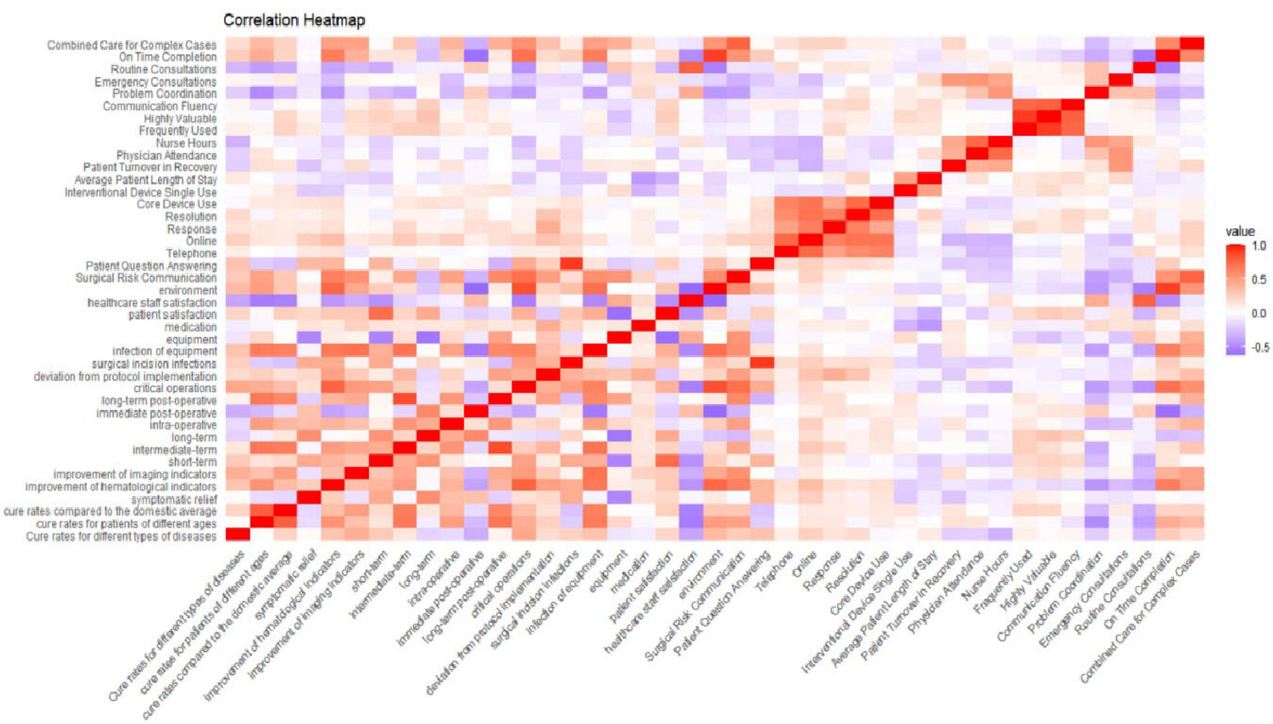

Figure 1 Heat map of correlation between patient scores in the management evaluation index system of hematological surgical interventional therapy. The x-axis is labeled "Evaluation Indicators", the y-axis is labeled "Correlation Coefficient", specifying that "Red gradient indicates positive correlation (0 to 1), and blue gradient indicates negative correlation (−1 to 0)".

Table 4 Reliability Analysis

	Cronbach'α	Standardisation Cronbach'α
Treatment outcomes	0.940	0.964
Medical safety	0.934	0.940
Service quality	0.958	0.961
Medical resources	0.876	0.898
Teamwork	0.869	0.906

Actual Cases

The Second Hospital Affiliated to Wenzhou Medical University is a comprehensive tertiary hospital, whose haematological surgery department has a high reputation in the region and carries out a large number of haematological surgical interventions every year. Before the management evaluation index system in haematological surgical interventions, there were some management problems in the hospital's haematological surgical interventions. The original evaluation system in our hospital focused on efficacy indicators, and the Cronbach's α of this system was 0.869–0.958, which was significantly higher than that of the original system (0.682–0.824). The results of the patient satisfaction survey showed that patients had more complaints about the long waiting time, insufficiently detailed communication between doctors and nurses, and insufficient postoperative rehabilitation guidance, with an overall satisfaction rate of only 65%. In terms of medical quality, the incidence of surgical complications was about 8%, and some of the surgical procedures were not standardised enough, which affected the treatment effect. In terms of medical resource utilisation, the equipment utilisation rate was about 60%, with a certain degree of idleness, low bed turnover rate, and longer average hospitalisation days for patients. After one year of implementing the indicator system, patient satisfaction has significantly improved to 85%. Further analysis of patient feedback revealed that patients highly valued the professionalism and service attitude of the medical and nursing staff. At the same time, the incidence of surgical complications was reduced to 4%, reaching the advanced level of the industry; the equipment utilisation rate was raised to 90%. By monitoring the equipment utilisation indicators, the hospital rationally arranged the surgical plan and avoided the waste of idle equipment. According to the volume of surgery and patient demand, the maintenance and repair plan of the equipment is optimised to ensure that the equipment is always in good operating condition. The turnover rate of beds has significantly improved, and the average number of patient days in hospital has been shortened by 1 day. Through real-time monitoring and analysis of bed usage, the hospital rationally allocates bed resources, reduces patients' waiting time for beds, and at the same time optimises the treatment process and improves patients' treatment efficiency Table 5.

Table 5 Comparison Before and After Implementation of the Indicator System

Evaluation Dimensions	Pre-Implementation Data	Post-Implementation Data
Patient Satisfaction	65%	85%
Surgical Complication Rate	About 8%	4%
Equipment Utilization Rate	60%	90%
Average Patient Length of Stay	8 days	7 days
Bed Turnover Rate	20 times/year	25 times/year
Healthcare Communication and Service Feedback	Patients complained about the lack of detailed communication between doctors and nurses	Patients highly evaluate the professionalism and service attitude of the medical staff
Postoperative Rehabilitation Guidance Feedback	Patients complained about the lack of postoperative rehabilitation instructions	Rehabilitation guidance coverage rate reaches more than 95%
Surgical Procedure Normality	Some of the surgical procedures were not standardized enough	Surgical procedure standardization rate is increased to 98%
Equipment Management	There was a certain degree of idleness in the equipment	Equipment failure rate is reduced to 5%
Bed Resource Allocation	The patients waited for beds for an average of two days	The average waiting time of patients for beds is shortened to 1 day

Discussion

As an emerging minimally invasive discipline integrating diagnostic imaging and clinical treatment, interventional therapy in hematologic surgery has been developing rapidly.[15] At the technical level, endoluminal intervention technology continues to innovate, aortic endoluminal repair, peripheral arterial endoluminal angioplasty and stenting are widely used, transcatheter thrombolysis, vascular embolization technology in the treatment of bleeding disorders and tumors with remarkable results in clinical practice, the treatment of minimally invasive, safe, efficient and so on, for many patients to bring new hope,[16] such as part of the hospitals with the help of interventional embolization therapy to deal with a variety of bleeding disorders, significantly reducing complications. For example, some hospitals have successfully dealt with a variety of bleeding conditions with the help of interventional embolization therapy, which significantly reduces complications and improves patients' quality of life.[17] However, there is a big gap between the management level of different regions and hospitals, and the lack of equipment, technology, and talents in primary medical institutions makes it difficult to practice advanced management models. Moreover, the degree of informatization of interventional therapy management is low, and data integration and analysis are insufficient, which affects the control and study of treatment effects and complications.[18] Based on this, this study constructed an evaluation index system for the management of interventional therapy in hematologic surgery, with a view to providing guidance for the management of hospitals.

This study conducted an in-depth literature research on the basis of interventional therapy, and established a preliminary index system to ensure the extensiveness of the management evaluation index system of haematological surgical interventions, and the index system was repeatedly revised through the form of experts' correspondence and interviews. The authority coefficient of the first round of correspondence was 0.8289, and after adjusting the system according to the experts' opinions, the authority coefficient of the second round of experts' correspondence was increased to 0.9039. The 28 interviewed experts who participated in this study came from various provinces and cities in China, including medical professionals, nursing professionals, and haematological surgeons, who are representative and authoritative in their respective fields, which provided solid professional support for the study and ensured that the management of haematological surgery interventional therapy was not only a good choice, but also an effective way to evaluate the management of haematological surgery. At the same time, the implementation of this index system requires an investment of approximately 50,000 yuan for staff training and data system upgrades. However, with the improvement in resource utilization, the investment can be recovered within 6 months.

In the stage of hierarchical analysis, this study demonstrates and improves the evaluation index system of haematological surgery interventional therapy management, and increases the credibility of the weights of the indexes by quantitatively calculating and dealing with the subjective ratings of the experts. After the construction of the index system was completed, this study chose 100 patients treated in haematological surgery to conduct a survey to ensure the good readability and authenticity of the index system and at the same time, the Cronbach'α coefficient was used to indicate the reliability of the index system of haematological surgery interventional therapy management. In addition, the content of the evaluation index system of haematological surgery interventional therapy management is closely related to the clinic, the index elements are complete, and it is practical and operable by simply collecting data.

The management evaluation index system constructed in this study covers four first-level indicators, namely, medical safety, medical service quality, medical resource utilisation and teamwork, which provides a comprehensive and detailed assessment framework for the clinical management and care of haematological surgical intervention. In clinical practice, these indicators show remarkable features, which strongly promote the optimisation and upgrading of medical services.

Level 1 indicators control the key areas of haematosurgical interventional therapy management at a macro level. Medical safety focuses on surgical safety, infection prevention and control, adverse event management and emergency equipment and drug protection, providing a solid foundation for treatment;[19] medical service quality focuses on patient satisfaction, pre-operative and post-operative communication, and complaint handling, improving patients' experience in all aspects;[20] medical resource utilisation aims to rationally deploy equipment, beds, manpower and materials, improving operational efficiency;[21] teamwork emphasises multidisciplinary consultation, information transfer, medical and nursing cooperation and inter-departmental project promotion, which is the key to the optimisation and upgrading of medical services. Teamwork emphasises multidisciplinary consultation, information transfer, medical and nursing care, and inter-departmental project promotion to enhance team cohesion and collaboration.[22]

As a subdivision of the first-level indicators, the second-level indicators play a key role in clinical management and nursing care. Indicators such as surgical error rate, infection incidence rate, timely reporting of adverse events, and completion rate of emergency equipment help to accurately manage medical safety; patient satisfaction, preoperative communication adequacy, completion rate of postoperative follow-up, and timely handling of complaints provide a clear direction for the improvement of healthcare service quality; equipment usage rate, bed turnover rate, medical and nursing workload rate, and turnover rate of drug and consumable stocks guide the efficient allocation of medical resources; multidisciplinary meetings and conferences are also used to enhance the effectiveness of medical care and nursing care, as well as to improve the quality of medical care. Equipment utilisation rate, bed turnover rate, workload rate of medical and nursing staff, drug and consumable inventory turnover rate, guiding the efficient allocation of medical resources; Timeliness of multidisciplinary consultation, accuracy of inter-departmental information transfer, satisfaction of teamwork, completion rate of inter-departmental collaborative projects, facilitating the efficient development of teamwork.

The three-level indicators penetrate into clinical practice and provide an accurate basis for management evaluation. In terms of medical safety, we assess the effectiveness of treatment to optimize the plan by comparing the cure rate of different disease types and age groups with the average cure rate of the same industry in China; we monitor the treatment process with the help of the changes of symptoms, haematology and imaging indexes in the short-, medium- and long-term as well as in the perioperative period; and we strictly control the deviation of key operations and plan execution to prevent the infection of surgical incisions and instruments and ensure the safety of equipment and medication. In terms of the quality of medical services, we assess the service experience in terms of the satisfaction of patients and medical staff, the satisfaction of the consultation environment, refine the information on surgical risks and the answers to patients' questions, and improve the quality of follow-up visits by the response and resolution of telephone and online follow-up visits. In the dimension of medical resource utilisation, we have improved the efficiency of core equipment and interventional devices, shortened the average length of stay of patients, accelerated the turnover of patients in the recovery period, reasonably arranged doctors' consultations and nurses' working hours, and optimised the turnover rate of stock of commonly used and high-value consumables. In the field of teamwork, we have strengthened the smoothness of communication between doctors and nurses and the degree of cooperation on problems, ensured timely and effective emergency and routine consultations, promoted the timely completion of interdepartmental projects, and improved the success rate of joint treatment for complex cases.

Conclusion

The multi-dimensional evaluation system constructed in this study is scientific and reliable. After implementation, it has significantly improved treatment outcomes and resource utilization efficiency, providing a standardized tool for the management of interventional therapy in hematologic surgery., The sample of this study was only from a single hospital, and regional differences in medical resources may affect the generalizability of the results; additionally, the index system does not incorporate special needs of patients with rare diseases. In the future, we will expand the sample size to include multi-center data and supplement relevant indicators to enhance applicability; with the rapid development of medical technology, such as the application of new interventional devices, the promotion of telemedicine in the Department of Hematologic Surgery and so on, the demand for new management indexes may arise. In conclusion, the index system effectively provides strong support for the management of hematology surgery and effectively promotes the improvement of the management level of the department. In the future, we will verify the universality of the system through multi-center studies involving hospitals in different regions and with varying resource allocations. Additionally, we plan to integrate artificial intelligence technology to develop a real-time evaluation module, enabling dynamic updates of indicator weights—for example, incorporating management indicators for new interventional devices as they emerge. These efforts aim to enhance the adaptability and timeliness of the index system, providing more targeted support for the management of hematological surgical interventional therapy.

Data Sharing Statement

The datas used and/or analyzed during the current study are available from the corresponding author.

Ethics Statement

This study was approved by the Human Ethics Committee of The Second Affiliated Hospital of Wenzhou Medical University (Ethics Approval Number: 2024-K-048-02). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Consent to Publish Declaration

All participants agreed to publish.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

There is no fund support from any institution or individual for this research.

Disclosure

The authors declare no conflicts of interest in this work.

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