

Research on the Application and Effectiveness of the DRG Model on Perioperative Medical Management of Cholecystectomy

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Abstract: *Objective:* This study aimed to explore the application and effectiveness of the DRG model in the perioperative management of cholecystectomy. By comparing the DRG model with traditional management methods, this study focused on evaluating the potential impact of the DRG model in improving surgical efficiency and reducing complication rates and medical costs. *Methods:* The random envelope method was used to divide patients scheduled for cholecystectomy from January 2021 to October 2023 into two groups: one group underwent surgery under the DRG model (experimental group), and the other group underwent the traditional management model (control group). Data including basic information, surgery-related data, length of stay, complication records, and medical expenses were collected. Data analysis was carried out using a *t*-test and chi-square (χ^2) test. *Results:* Results showed that the DRG model shortened the average length of stay, decreased the incidence of complications, reduced medical expenses, and increased patient satisfaction. These results demonstrate the effectiveness of the DRG model in the perioperative management of cholecystectomy, especially in improving surgical efficiency, reducing medical costs, and improving patient satisfaction. *Conclusion:* The DRG model in the perioperative management of cholecystectomy can significantly improve medical service quality and efficiency and enhance patient satisfaction as compared to traditional treatment methods.

Keywords: DRG model; Cholecystectomy; Medical management

Online publication: February 26, 2024

1. Introduction

Cholecystectomy is currently the main method of treating gallbladder disease, playing a vital role in relieving patients' symptoms, preventing complications, and improving quality of life. However, with the rising prevalence of gallbladder disease, particularly in developed nations, there is an increasingly pressing need to enhance the management and streamline the process of cholecystectomy surgery^[1]. This involves the surgical technique and includes many aspects, such as preoperative preparation, intraoperative management, and postoperative recovery. The diagnosis-related group (DRG) model has gained attention as it has shown advantages in improving the quality of medical services, reducing costs, and promoting hospital management.

Nonetheless, the research gaps in the specific applications and effectiveness of the DRG model in the perioperative management of cholecystectomy need to be addressed.

The intensive medical management is systematic and comprehensive. It aims to improve the quality and efficiency of medical services by optimizing resources and improving management efficiency [2]. Intensive medical management also strengthens team collaboration and communication, reduces costs, and has economic benefits. This shows that intensive medical management can enhance the efficiency and quality in the perioperative management of cholecystectomy, thereby sustaining a lead position among medical institutions. This article evaluates the application and effectiveness of the DRG model in the perioperative management of cholecystectomy by comparing it with traditional methods and aims to explore the potential impact of the DRG model in the perioperative management of cholecystectomy in relation to intensive medical management.

2. Methods

2.1. Research design

Patients admitted from January 2021 to October 2023 were divided into two groups using the random envelope method. The experimental group underwent surgery based on the DRG model while the control group underwent surgery based on the traditional management model. Inclusion criteria: patients over 18 years old who planned to undergo cholecystectomy. Exclusion criteria: patients with severe comorbidities (severe heart disease, renal failure) or patients who have undergone previous surgeries.

2.2. Intervention methods

Based on the DRG model, we established a professional multidisciplinary collaborative cholecystectomy team dedicated to providing patients with comprehensive, coherent, and high-quality medical services. The team consisted of highly experienced surgeons, anesthetists, nurses, nutritionists, and rehabilitation practitioners. The team's core responsibility was to manage patients during the perioperative period, starting from the preoperative assessment and surgical execution to postoperative recovery. This was to ensure that patients received the utmost care during each step of the treatment. To achieve this, a close communication and collaboration mechanism was established to ensure that information was transmitted efficiently and accurately within the team. Team members also received professional training regularly to improve their skills and service levels. By implementing a joint responsibility system, we strived to optimize every aspect of the medical services provided, thereby effectively improving treatment outcomes and safety, reducing patients' recovery time, and ultimately enhancing patient satisfaction.

2.2.1. Developing a standardized diagnosis and treatment process for cholecystectomy

To ensure that patients receive a standardized, high-quality medical service under the guidance of the DRG model, we developed a standardized diagnosis and treatment process for cholecystectomy based on the single-disease management model. This process covered various key aspects regarding preoperative assessment, surgical operation, and postoperative care, by focusing on the prevention of perioperative infection. Strict norms and standards were adhered to. During the preoperative evaluation stage, the patients' physical condition and surgical risks were comprehensively evaluated to ensure the safety and feasibility of the surgery. During the operation, internationally recognized surgical standards and procedures were strictly followed to ensure the accuracy and efficiency of the operation. During postoperative care, we formulated a detailed care plan which included pain management, complication prevention, nutritional support, etc., to ensure that patients can recover quickly and to minimize the incidence of complications. Through this process, the patients were provided with

a stable, reliable, and high-quality service experience.

2.2.2. Integrating medical resources

To improve the utilization of medical resources, a centralized management of medical equipment, drugs, and human resources was founded. Firstly, we established a unified medical equipment management system to deploy and maintain equipment, to ensure that all equipment were in optimal condition and could be accessed when needed. We also implemented the strict management and monitoring of drug inventory, and adjusted drug procurement plans based on the actual needs of patients to avoid wastage. As for human resource management, we maximized the medical staff's professional capabilities and efficiency through scientific scheduling and flexible deployment. In addition, we also established close relationships with suppliers to ensure the stability and timeliness of material supply so that the patients could be provided with the best medical equipment and service.

2.2.3. Establishing an information management system

To improve the management efficiency of medical services, a complete information platform was established, including an electronic medical record system and a surgery management system. This platform could record and store patients' medical information in real-time, including medical history, diagnosis results, surgical records, etc., thus ensuring the accuracy and comprehensiveness of all information. Through the electronic medical record system, medical staff could access the patients' records whenever and understand the patient's condition and treatment protocol to make accurate and timelier decisions. The surgery management system was used to monitor the operation in real-time, to ensure a smooth process and optimize resource allocation. This platform enabled real-time information sharing, promoted effective communication, improved the management efficiency of medical services, and overall enhanced the patient's experience.

2.2.4. Strengthening quality control and risk management

A regular quality assessment and risk management protocol was established to continuously improve the quality of medical services provided. This protocol was designed to monitor and evaluate the diagnosis and treatment process of cholecystectomy in real time and to identify potential problems. By collecting and analyzing real-time data, we could objectively evaluate the quality and effectiveness of the surgery. Necessary improvements were performed when necessary. Risk management was prioritized to identify potential risk factors during diagnosis and treatment, and preventive measures and emergency plans were formulated to ensure patient safety. This measure enabled a continuous improvement in the quality of medical services, reduced complications, and provided patients with a safer and more reliable medical environment.

2.2.5. Optimizing patient services

Comprehensive patient care services were provided. During the preoperative stage, patients were provided with personalized education and psychological support to help patients fully understand the process and possible risks. This initiative aimed to reduce patients' anxiety and increase their confidence and compliance. During the postoperative recovery stage, the patients were closely monitored whereby nutritional support and rehabilitation exercises were also provided. Based on the patients' specific needs and conditions, personalized rehabilitation plans were developed to aid in the restoration of physical functions and enhance their quality of life. Comprehensive care and support were also provided to patients to promote their physical and mental health and recovery.

2.2.6. Establishing a continuous improvement mechanism

Patient feedback and team member suggestions were regularly collected. By establishing effective feedback platforms and conducting regular satisfaction surveys, the patients' need for medical services could be understood precisely. Team members were also encouraged to provide suggestions for improvements. Based the feedback obtained, the implementation plan was optimized, including adjustment of diagnosis and treatment procedures, renewal of medical equipment, and improvement of service quality. This approach ensured that medical services align with the patient's needs and market developments, thereby constantly improving our competitiveness and reputation.

2.3. Data collection

Data were collected through the hospital's electronic medical record system, including basic patient information, surgery-related data, length of stay, complication records, and medical expenses.

2.4. Data analysis methods

Data were recorded in the form of mean \pm standard deviation and percentages. The *t*-test was used to compare the average length of stay and medical expenses between the two groups, and the chi-square (χ^2) test was used to compare the incidence of complications between the two groups; $P < 0.05$ indicates statistically significant difference.

3. Results

Table 1 shows that there was no significant difference in basic information such as age, gender ratio, and medical history of patients before and after the implementation of the DRG model ($P > 0.05$).

Table 1. Basic characteristics of patients

Condition	Before the implementation of the DRG model (control)	After the implementation of DRG model (observation)	<i>P</i>
Sample size (person)	100	100	
Average age (years)	55.21 \pm 10.01	53.17 \pm 11.01	> 0.05
Gender			
- Male	38	42	
- Female	62	58	
Medical history			
-Diabetes (example)	9	11	
-High blood pressure (example)	43	39	

After the implementation of the DRG model, the average hospitalization time and complication rate of patients were lower than before the implementation ($P < 0.05$; **Table 2**).

Table 2. Perioperative management results

Condition	Before the implementation of the DRG model (control)	After the implementation of DRG model (observation)	<i>t</i> , χ^2	<i>P</i>
Average length of stay (days)	6.51 \pm 1.33	5.01 \pm 1.21	<i>t</i> = 8.34	< 0.05
Complication rate (%)	15.22	10.14	χ^2 = 1.14	< 0.05

Table 3 shows that after the implementation of the DRG model, patients' average medical expenses, satisfaction, and readmission rate were all better than before the implementation ($P < 0.05$).

Table 3. Cost-benefit analysis

Condition	Before the implementation of the DRG model (control)	After the implementation of DRG model (observation)	t, χ^2	P
Average medical expenses (yuan)	7,214.38 ± 229.11	5,203.92 ± 211.34	$t = 64.49$	< 0.05
Patient satisfaction (%)	80	95	$\chi^2 = 2.684$	< 0.05
Re-admission rate (%)	11	1	$\chi^2 = 8.4158$	< 0.05

4. Discussion

This study showed that implementation of the DRG model in the perioperative management of cholecystectomy significantly improved surgical efficiency, reduced complication rates and medical costs, and improved patient satisfaction. The DRG model also aided in optimizing the utilization of medical resources, standardizing treatment procedures, and improving the quality of medical services^[3]. Furthermore, the DRG model has demonstrated significant advantages in shortening the length of hospital stay and reducing complications.

The results of this study were consistent with several studies that also reported positive outcomes of similar optimization measures, such as enhanced recovery after surgery (ERAS) protocols, in improving surgical efficiency and reducing costs^[4]. However, this study primarily adopted the DRG model in cholecystectomy by providing more insights to this field.

There are several limitations to this study. The limited sample size and patient diversity may affect the validity of the results. In addition, the randomization process and control group setting may have affected result interpretation. Therefore, these limitations need to be considered when interpreting the results.

Large-scale and multicenter studies can be conducted in the future to increase the representativeness and external validity of the results. Long-term follow-up and comparative studies of different patient groups can also be carried out. These will contribute to a more comprehensive understanding of the long-term effects and applicability of the DRG model in different patient populations.

5. Conclusion

The implementation of the DRG model in the perioperative management of cholecystectomy showed significant potential in improving the quality and efficiency of medical services^[5]. By optimizing resource allocation, standardizing treatment processes, and emphasizing quality control, the DRG model provided patients with better medical services and overall enhanced patient satisfaction. Despite some limitations, the findings of this study provide important guidance for future research and clinical practice, emphasizing the importance of the DRG model in the healthcare system.

Disclosure statement

The authors declare no conflict of interest.

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