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ARTICLE

Effect Analysis of Quality Control Circle on Improving the Qualification Rate of Bowel Preparation for Electronic Colonoscopy in Hospitalized Patients

Xincheng MA and Lei Peng*

The Seventh Affiliated Hospital, Sun Yat-sen University, Shenzhen, China
*Corresponding author. Email: penglei@sysush,https://orcid.org/0000-0001-6082-9898

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Abstract

Objective: This study aims to investigate the impact of quality control circle activities on enhancing the qualified rate of bowel cleansing before electronic colonoscopy in hospitalized patients. **Methods:** A total of 200 patients from the Department of Gastroenterology at our hospital were selected as study subjects during the second quarter of 2022. The quality control circle management group conducted focused discussions to comprehensively evaluate the current situation, analyze underlying factors, calculate the qualified rate of bowel preparation, and implement appropriate control measures. **Conclusion:** The qualified rate of bowel preparation significantly improved after the implementation of the quality control circle activities, with statistical significance ($P < 0.05$).

Keywords: Quality control circle activities; Inpatients; Electronic colonoscopy; Qualified rate of bowel preparation

Electronic colonoscopy represents the most effective and efficient approach for colon cancer screening, facilitating the diagnosis and treatment of intestinal diseases while demonstrating a notable reduction in the risk of colorectal cancer-related mortality [1.2]. Notably, the identification and removal of polyps through the employment of colonoscopy significantly decrease the incidence of colon cancer within the population. Extensive research has consistently affirmed the efficacy of endoscopic polyp resection in preventing the development of colon cancer prior to the manifestation of malignant lesions. The success rate and lesion detection rate of electronic colonoscopy are contingent upon the meticulousness of bowel preparation prior to the procedure. Consequently, bowel preparation assumes a paramount role as the primary preoperative measure for ensuring the optimal

utilization of electronic colonoscopy in clinical practice. Currently, the prevailing benchmarks utilized to assess bowel preparation primarily revolve around the concept of bowel cleanliness. Inadequate bowel preparation, characterized by suboptimal cleanliness, can obscure lesions and contaminate the mirror surface, thereby compromising the accuracy of the examination. Moreover, unqualified bowel preparation adversely affects the operation of bowel examination, leading to an increased incidence of misdiagnosis and missed diagnoses [3]. Consequently, the accuracy and quality of examination results are diminished, significantly impacting the overall inspection quality and outcomes. Bowel cleanliness is influenced by numerous factors, encompassing patient age, gender, patient-specific bowel function, and the selected bowel preparation methods. Among these factors, the patient's own bowel function and the chosen bowel preparation techniques emerge as the most influential determinants. The implementation of quality control circle activities, grounded in the Plan-Do-Check-Act (PDCA) principle, reveals a systematic approach to address these concerns. By identifying problems, ascertaining their root causes, proposing appropriate countermeasures, and fostering continuous improvement, quality control circle activities offer a straightforward and expeditious means of effecting change. In this study, the primary aim is to analyze the impact of employing the brainstorming method, facilitated by members of the quality control circle management group, on improving the qualified rate of bowel preparation for colonoscopy in hospitalized patients. By engaging in critical discussions and assessments of the prevailing situation, the management group endeavors to identify the underlying causes of poor bowel preparation, devise effective control measures, and ultimately enhance the qualified rate of bowel preparation. To achieve these objectives, a sample of 200 patients from the Department of Gastroenterology in a hospital was selected during the second quarter of 2022. A comparative analysis of the qualified rate of bowel preparation before and after the implementation of quality control circle activities was conducted, supported by rigorous statistical analysis to ascertain the significance of the observed improvements. In conclusion, this study seeks to investigate the tangible benefits derived from the implementation of quality control circle activities to enhance the qualified rate of bowel preparation for electronic colonoscopy in hospitalized patients. By employing the brainstorming method within the quality control circle framework, the management group aims to address the multifaceted factors influencing bowel cleanliness, thereby optimizing the accuracy and quality of colonoscopy examinations.

1. General Data

Data: The data for this study comprised 200 patients selected from the Department of Gastroenterology at our hospital during the second quarter of 2022. The inclusion criteria were as follows: (1) Patients with gastrointestinal cancer were excluded and only those with confirmed digestive system diseases through relevant medical examinations were included. (2) Clinical data completeness was relatively high. (3) Patients demonstrated a high level of cooperation. (4) All patients signed the informed consent form [4.5] .for this study.Exclusion criteria: (1) Patients who did not cooperate with bowel preparation. (2) Female patients who were in the menstrual period. (3) Patients diagnosed with malignant tumors of the digestive system. (4) Patients with other underlying cardiovascular and cerebrovascular diseases.The

observation group consisted of patients aged 18–73 years, with a mean age of (49.89 ± 11.1) years. There were 63 male patients and 37 female patients. The control group comprised patients aged 17–74 years, with a mean age of (47.74 ± 11.49) years. There were 68 male patients and 32 female patients. Although there were differences in age, gender, and other factors between the two groups, these differences were not statistically significant ($P > 0.05$).

2. Methods

In this experimental study, 100 patients in the control group did not participate in quality control circle activities, while 100 patients in the intervention group engaged in quality control circle activities. The intervention group established quality control circle management groups, wherein the members proposed and selected circle names and emblems within a week. Additionally, counselors, circle leaders, and circle personnel were identified, and the responsibilities of each personnel level were formulated. The group leader was assigned to the highly responsible nurse of the department, and the counselor was designated as the head nurse of the department. The other group members included one chief physician, seven nurses, and eight members who collectively acquired relevant concepts and methods of quality control circles to enhance the implementation of quality services.To ensure the authenticity of the data, the chief physician among the team members conducted quality control. All caregivers utilized the head brainstorming method, and the Boston Scoring Scale [6] was employed to evaluate the cleanliness of patients during bowel cleansing. In cases where patients exhibited incomplete cleaning, the reasons for unqualified intestinal tract preparation were identified, and a fishbone diagram (see Figure 1) was constructed to focus on the analysis. The fishbone diagram was drawn considering the four aspects of people, objects, methods, and management rings [7.8]. Prior to the quality control circle activity, the reasons for the low cleaning rate of intestinal tract preparation were clarified as follows: 1) patients did not adhere to the prescribed diet preparation, 2) patients did not follow instructions regarding oral laxative intake, 3) the interval between the last dose of laxatives and the examination exceeded 5 hours, 4) nurses failed to supervise patients during oral laxative administration, and 5) nurses neglected to check the stool. Notably, 81.25% of patients had an interval of more than 5 hours between their last dose of laxatives and the examination time. The underlying reason for the low cleaning rate of intestinal tract preparation can be attributed to the imperfect quality control of administration observation. Following extensive discussion and analysis by the group members, we identified three key areas for rectification. Hence, we focused on improving the bowel preparation process for 100 patients in the intervention group. The specific improvements included the following:A designated member from the management group was assigned to guide the bowel preparation process for the 100 patients. The examination time points were determined in collaboration with the doctor, specifically at 9:00 am and 20:00 am on the day before the examination, 5 hours and 1 hour prior to the examination. The group members were responsible for guiding the patients and ensuring timely medication administration based on the designated time and dosage. Patients were informed about the critical importance of adhering to the prescribed time for the last dose of laxatives. To facilitate this, time arrangements and observation record cards were created for each pack of oral laxatives.

Detailed inquiries regarding patient defecation were recorded on the card, and compliance with the bowel preparation process was evaluated. In cases where patients deviated from the prescribed process, timely intervention was initiated. If intervention was not feasible, the patient's participation in the study was canceled, and they were replaced with the next eligible patient. The colonoscopies for the 100 enrolled patients were scheduled between 9:00 and 10:00 am [9.10].

3. Outcome Measures

The observation group was analyzed and compared with the control group based on specific outcome measures. The colon was divided into three segments (cecum and ascending colon; hepatic flexure, transverse colon, and splenic flexure; descending colon, sigmoid colon, and rectum) using the Boston scale. This scale classifies bowel cleanliness into four grades (0-3): 0 points indicate the inability to observe the entire intestinal mucosa due to unremovable solid or liquid feces; 1 point signifies partial obstruction of the intestinal mucosa due to fouling, turbid fluid, and residual feces; 2 points represent a well-observed intestinal mucosa with minimal fouling spots, turbid fluid, and feces; and 3 points indicate a well-observed intestinal mucosa with no residual fouling spots, turbid fluid, or feces. The total score ranges from 0 to 9, and a Boston scale score 6 indicates qualified bowel preparation. Based on the data, it was observed that 57 patients and 43 patients achieved qualified bowel preparation in the observation group, while 90 patients and 10 patients achieved qualified bowel preparation in the control group. The observation group comprised 63 male patients and 37 females, whereas the control group consisted of 68 male patients and 32 females.

4. Statistical Methods

Excel software was used to organize the data, and SPSS 20.0 statistical software was employed for data analysis. The independent sample t-test was utilized to compare the two groups. Enumeration data were presented as counts or percentages, and the chi-square test was employed for group comparisons. A significance level of $P < 0.05$ was considered statistically significant.[11]

5. Results

Through a thorough analysis of the data from the observation group and the control group, it can be firmly concluded that there is no significant variation in the qualified rate of bowel preparation among patients of different age groups in this study ($P > 0.05$). This outcome indicates that the qualified rate of bowel preparation remains consistent across various age groups (refer to Table I).

Similarly, by meticulously scrutinizing the data obtained from the observation group and the control group, it can be firmly concluded that there is no statistically significant difference in the qualified rate of bowel preparation between patients of different genders in this study ($P > 0.05$). Hence, the qualified rate of bowel preparation does not vary based on gender (refer to Table II).

Based on the comprehensive analysis of the data acquired from the observation group and the control group, a compelling finding emerges: the qualified rate of bowel preparation

Table I

Age	Observation group	Control group	Test value	P value
< 18 years	0	1	-0.742	0.458
18-40 years	18	25		
40 to < 60 years	62	60		
≥ 60 years	20	14		

Table II

Gender	Observation group	Control group	Test value	P value
Male	63	68	-0.742	0.458
Female	37	32		

among patients in the quality control circle intervention group is significantly higher than that in the intervention group alone. Consequently, a statistically significant difference exists in the qualified rate of bowel preparation between these two groups ($P < 0.05$). These results, as presented in Table IV, underscore the effectiveness of the quality control circle intervention in improving the qualified rate of bowel preparation. (refer to Table III)

Table III

Pass rate of bowel preparation	Observation group	Intervention group	Test value	P value
Pass	57	90	5.274	< 0.001
Fail	43	10		

6. DISCUSSION

Since the advent of electronic colonoscopy in 1983, there have been significant advancements in science and technology, leading to its widespread use in diagnosing digestive system diseases. Electronic colonoscopy has become the gold standard for detecting colon diseases. However, in order to ensure accurate examination results, proper bowel preparation is crucial. Inadequate bowel preparation can result in the presence of residual feces, obstructing the visual field and leading to missed diagnoses and misdiagnoses. To mitigate the risk of missed diagnoses and misdiagnoses, it is imperative to prioritize thorough bowel preparation to enhance the success rate of the examination for patients [12.13].The quality control circle

activity has emerged as an effective nursing management model. Implementing quality control circle activities can enhance work efficiency, optimize processes, and foster personal growth among group members. By participating in these activities, nurses can improve their skills, gain a sense of accomplishment and self-confidence, and foster strong teamwork, ultimately elevating the overall level of patient care [14.15]. Through quality control circle nursing management, tailored nursing interventions related to bowel preparation can be provided based on a comprehensive understanding of patients. By analyzing the underlying reasons and strengthening supervision and examination processes, the quality of bowel preparation can be enhanced. Educational materials are developed in a concise and comprehensible manner to provide patients with relevant explanations, thus improving their cooperation and compliance [16]. Through these targeted improvements, the qualified rate of bowel preparation among patients can be elevated, consequently leading to an improved success rate of electronic colonoscopy.

7. SUMMARY

In summary, the findings of this study demonstrate a significant improvement in the qualified rate of bowel preparation following the implementation of the investigation activity. These results provide strong evidence supporting the assertion that the quality control circle management approach can effectively enhance the qualified rate of bowel preparation in patients undergoing colonoscopy. As a result, it contributes to the achievement of successful enteroscopy outcomes, enhanced lesion detection rates, and other important clinical parameters. These noteworthy outcomes highlight the potential for widespread adoption of the quality control circle management model in clinical nursing practice.

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