6-Sigma Management Model Improves Nursing Satisfaction in Gastric Cancer Patients Undergoing Subtotal Gastrectomy: Postprint

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Abstract

Objective To investigate the application effects of the 6-Sigma management model in nursing care for patients after subtotal gastrectomy for gastric cancer, and to analyze its impact on patient physiological indicators, quality of nursing care, and cost management.

Methods A total of 200 patients who underwent subtotal gastrectomy for gastric cancer in our hospital were selected, including 100 patients in the observation group who received the 6-Sigma management model and another 100 patients in the control group who received conventional management. Pain, anxiety, physiological indicators, quality of nursing care, satisfaction, length of hospital stay, and hospitalization costs were compared between the two groups at different time points.

Results The pain and anxiety scores of the observation group on postoperative day 5 and 1 day before discharge were significantly lower than those of the control group ($P<0.05$). Statistically significant differences were found between the observation and control groups in patient satisfaction (93% vs 81%), nurse satisfaction (95% vs 76%), and quality of nursing care scores (92.32±5.29 vs 80.41±6.34). The length of hospital stay in the observation group was shorter than that in the control group (13.5±3.1 d vs 17.2±4.6 d, $P<0.05$). The total hospitalization costs in the observation group were 24588.3±4282.2 yuan, with daily costs of 1823.2±323.6 yuan, both significantly lower than those in the control group.

Conclusion 6-Sigma management helps alleviate anxiety, reduce pain, improve quality of nursing care, shorten length of hospital stay, decrease hospitalization costs, and enhance patient and nurse satisfaction in patients after subtotal gastrectomy for gastric cancer.

Full Text

Improving Nursing Satisfaction in Patients Undergoing Subtotal Gastrectomy for Gastric Cancer Through 6-Sigma Management

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Abstract

Objective To investigate the application effects of 6-Sigma management in postoperative nursing care for patients undergoing subtotal gastrectomy for gastric cancer, and to analyze its impact on physiological indicators, nursing quality, and cost management. **Methods** A total of 200 patients who underwent subtotal gastrectomy for gastric cancer in our hospital were selected. Among them, 100 patients were assigned to the observation group and managed with the 6-Sigma model, while the other 100 patients served as the control group and received conventional management. The two groups were compared in terms of pain levels, anxiety, physiological indicators, nursing quality, satisfaction, hospitalization duration, and hospitalization costs at different time points. **Results** The pain and anxiety scores of the observation group were significantly lower than those of the control group on postoperative day 5 and 1 day before discharge ($P<0.05$). Statistically significant differences were observed between the observation and control groups in patient satisfaction (93% vs. 81%), nurse satisfaction (95% vs. 76%), and nursing quality scores (92.32±5.29 vs. 80.41±6.34). The observation group had shorter hospital stays than the control group (13.5±3.1 days vs. 17.2±4.6 days, $P<0.05$). The observation group also had significantly lower total hospitalization costs (24,588.3±4,282.2 yuan) and daily costs (1,823.2±323.6 yuan) compared with the control group. **Conclusion** 6-Sigma management helps alleviate anxiety and reduce pain in patients after subtotal gastrectomy for gastric cancer, improves nursing quality, shortens hospital stays, reduces hospitalization costs, and enhances satisfaction among both patients and nurses.

Keywords: 6-Sigma management; subtotal gastrectomy for gastric cancer; nursing satisfaction

Introduction

The 6-Sigma management model is data-driven, emphasizing workflow standardization and quantitative analysis to identify key factors affecting quality. Through brainstorming, it develops rational and effective solutions to address existing problems and further improve clinical nursing management quality. This

management model has been widely applied across various clinical specialties, including internal medicine, surgery, gynecology, and pediatrics, achieving favorable outcomes. Currently, research on postoperative care for subtotal gastrectomy lacks detailed, systematic, and standardized studies, which hinders improvement in postoperative quality of life for these patients. Additionally, clinical management after subtotal gastrectomy faces challenges such as heavy nursing workloads, declining nursing quality, and low satisfaction among both patients and nurses. However, no studies have evaluated nursing care for these patients from the perspective of 6-Sigma management. Against this backdrop, our study investigated the application effects of 6-Sigma management in postoperative nursing care for patients undergoing subtotal gastrectomy for gastric cancer to assess its effectiveness.

Methods

1.1 General Data

A total of 200 patients diagnosed with gastric cancer between January 2013 and December 2016 in our hospital were selected as study subjects. According to the order of hospital admission, patients were randomly assigned to either the observation group or the control group, with 100 patients in each group. The observation group received 6-Sigma management, while the control group received conventional nursing care. The observation group consisted of 63 males and 37 females, with a mean age of 53.16±14.62 years. The control group comprised 66 males and 34 females, with a mean age of 52.34±17.19 years. No statistically significant differences were found between the two groups in terms of gender composition, age, or education level ($P>0.05$).

1.2 Nursing Methods

After conventional open distal subtotal gastrectomy, patients in the control group received routine management methods, including health education, positioning and dietary care, and effective communication. Cases with the highest patient satisfaction were selected and discussed to develop standard procedures, which were then strictly implemented. Patients in the observation group received optimized management using the 6-Sigma model, with the following specific procedures:

1.2.1 Define Phase A project team was established with the Operations Management Department and Gastrointestinal Tumor Surgery as the core components. The head nurse served as the leader of the 6-Sigma project team, forming a three-tier nursing management group consisting of head nurse—charge nurse—responsible nurse. Team members received training in 6-Sigma knowledge and used brainstorming to jointly develop relevant factors that might affect nursing quality after subtotal gastrectomy for gastric cancer.

1.2.2 Measure Phase Data were collected on gastric cancer patients who underwent subtotal gastrectomy in the gastrointestinal tumor surgery department, including their hospital experiences and satisfaction. Information on admission examinations, treatment received, nursing services, and adverse events during treatment were uniformly entered into a specific computer software system to calculate the Z-value of patient dissatisfaction rate (which reflects the room for improvement in nursing management quality). Project team members conducted detailed analyses of existing and potential problems in nursing management.

1.2.3 Analysis Phase Factors potentially affecting nursing quality were considered from five aspects: personnel, equipment, environment, materials, and methods. Measurement data were used to analyze key factors, leading to the following considerations: (1) Nursing workflow: whether tasks were overly concentrated, excessive in volume, or properly executed; (2) Ward environment: whether staffing was appropriate and whether the space was spacious, clean, and quiet; (3) Personnel service: whether effective communication was utilized.

1.2.4 Improvement Phase

(1) Establish a clinical nursing quality management control system: A new nursing quality control group was established based on the characteristics of clinical nursing management in the tumor surgery department. (2) Clinical nursing quality control management: Designated quality control officers were assigned to manage each quality control indicator, with each officer responsible for 3-4 nursing tasks. A three-level quality control model was formed during clinical nursing: head nurse or charge nurse—quality control officer—clinical nurse.

1.2.5 Control Phase The new nursing care protocol for patients after subtotal gastrectomy was implemented, with regular questionnaires administered to patients, their families, and medical staff during treatment. (1) Establish a nursing quality evaluation and control system: The nursing quality control group regularly refined and quantified quality indicators and calculation methods that lacked precision, revising and establishing feasible quality control indicators. (2) Clinical nursing quality control methods: The inspection procedure included checking, feedback, rectification, and continuous improvement, followed by weekly verification. Emphasis was placed on combining monthly key projects with routine inspections, as well as integrating longitudinal checks with cross-checks.

1.3 Observation Indicators

For both the control and observation groups, the following were measured 1 day before surgery, on postoperative day 5, and 1 day before discharge: (1) Pain level: measured using the Visual Analogue Scale (VAS), with scores ranging

from 0-10, where higher scores indicate stronger pain sensation; (2) Anxiety level: measured using the Self-Rating Anxiety Scale (SAS), with scores ranging from 20-80, where higher scores indicate more severe anxiety; (3) Physiological indicators: basic vital signs including heart rate, respiration, body temperature, and blood pressure. Nursing quality, patient satisfaction, nurse satisfaction, hospitalization duration, and hospitalization costs were also observed between the two groups.

1.4 Statistical Methods

Data were processed using SPSS 19.0 statistical software. Measurement data were expressed as mean±standard deviation, and comparisons between the two groups were performed using t-tests. Count data were analyzed using chi-square tests. $P<0.05$ was considered statistically significant. ANOVA was used to compare various indicator scores between the two groups.

Results

2.1 Comparison of Indicators

No statistically significant differences were found in pain and anxiety scores between the two groups before surgery. These scores showed progressive declines on postoperative day 1, postoperative day 5, and 1 day before discharge. Intergroup comparisons revealed that pain and anxiety scores in the observation group were significantly lower than those in the control group on postoperative day 5 and 1 day before discharge ($P<0.05$). Heart rate showed a gradual decreasing trend in both groups ($P<0.05$), but intergroup differences were only statistically significant on postoperative day 5, with the observation group lower than the control group ($P<0.05$). Respiratory rate also showed a gradual decreasing trend ($P<0.05$), but no statistically significant intergroup differences were found at any of the three time points ($P>0.05$). Body temperature did not differ across time points, and no statistically significant intergroup differences were observed ($P>0.05$). Blood pressure showed a gradual decreasing trend ($P<0.05$), but intergroup differences were only statistically significant 1 day before discharge, with the observation group lower than the control group ($P<0.05$,).

2.2 Comparison of Satisfaction and Nursing Quality Scores

Patient satisfaction in the observation group was 93%, nurse satisfaction was 95%, and the average nursing quality score was 92.32±5.29, all significantly higher than those in the control group, with statistically significant differences ($P<0.05$,).

2.3 Comparison of Hospitalization Duration and Costs

The average hospitalization duration in the observation group was 13.5±3.1 days, significantly shorter than that in the control group ($P<0.05$). Total hospitalization costs were 24,588.3±4,282.2 yuan, and daily costs were 1,823.2±323.6 yuan, both significantly lower than those in the control group ($P<0.05$,).

Discussion

Gastric cancer ranks second among malignant tumors worldwide, with China' s incidence accounting for 42% of global cases, second only to lung cancer. Currently, surgical resection is the primary treatment for gastric cancer. However, given the extensive surgical trauma, long duration, and numerous postoperative complications, postoperative nursing care for gastric cancer patients requires significant attention. Nevertheless, throughout the evolution of postoperative gastric cancer nursing research, it is evident that detailed, systematic, and standardized nursing management systems remain a key focus.

6-Sigma is a customer-centered, data-driven management model that emphasizes proactive improvement and collaborative cooperation, focusing on workflow standardization and pursuing "zero defects" in product quality. Compared with QCC and FMEA, 6-Sigma considers all aspects from the patient' s perspective, providing comprehensive management of both nursing processes and outcomes with more thorough consideration, thereby better facilitating the achievement of "zero defect" goals in nursing services. By applying the five-step "Define, Measure, Analyze, Improve, Control" methodology of this management model to postoperative nursing care for gastric cancer patients, the approach emphasizes patient-centered care and provides new and reasonably personalized nursing plans to improve postoperative quality of life.

Gastric cancer patients often experience pain due to surgical wounds and various postoperative nursing procedures. Combined with concerns about postoperative recurrence and complication rates, they consequently develop negative emotions such as anxiety and tension, which severely impact treatment and prognosis. This study implemented 6-Sigma management in patients after subtotal gastrectomy to identify factors affecting nursing satisfaction, focusing on analyzing nursing workflow, ward environment, and personnel services. A new nursing management system and three-level quality control model were established for improvement and subsequent control of positive developments. The study found that pain and anxiety indices in the observation group using 6-Sigma management were significantly lower than those in the control group on postoperative day 5 and 1 day before discharge, consistent with currently advocated nursing interventions and with findings that ward optimization can alleviate patient pain and anxiety. Although physiological indicators such as heart rate, respiration, body temperature, and blood pressure in the observation group did not reach statistical significance compared with the control group, their numerical decline reflected faster overall physiological recovery in patients after 6-Sigma

management. These results align with the validated perspective that 6-Sigma management helps improve nursing techniques and thereby enhances nursing quality. The observation group in this study emphasized comprehensive patient assessment, implementation of personalized plans, and adoption of a three-level quality control approach with reasonable division of labor, which improved nurse work efficiency and fulfilled the goal of returning time to nurses. These results are consistent with findings from other studies and avoid disputes caused by nursing oversights, thereby providing maximum nursing care to patients. Consequently, patient satisfaction, nurse satisfaction, and nursing quality in the observation group were significantly higher than in the control group. Precisely because 6-Sigma management emphasizes thinking from the patient' s perspective and adjusting patient emotions, it establishes a new management system for postoperative gastric cancer nursing, improves nursing standards, facilitates early patient recovery, and thereby reduces hospitalization duration and costs. The study results indicate that average hospitalization duration and costs in the observation group were significantly superior to those in the control group, consistent with findings from previous research.

In summary, applying the 6-Sigma management model in postoperative nursing care for patients undergoing subtotal gastrectomy for gastric cancer can reduce postoperative pain, alleviate patient anxiety, improve satisfaction among both patients and nurses, shorten hospital stays, and reduce hospitalization costs. The nursing effects are remarkable and warrant further clinical reference and promotion.

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Note: Figure translations are in progress. See original paper for figures.