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Original Article

Precision-based tertiary care improves nutritional status and quality of life in patients undergoing adjuvant chemotherapy after radical gastrectomy for gastric cancer

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Abstract: Objective: To assess the impact of a precision-based tertiary care protocol, including participatory dietary care, on the nutritional status, immune function, and quality of life in gastric cancer patients after radical gastrectomy. Methods: The clinical and laboratory data of 124 patients diagnosed with gastric cancer at the Second People's Hospital of Lanzhou City from June 2020 to May 2022 were collected and retrospectively analyzed. The patients were grouped into a control group of 54 patients who received standard care and a study group of 70 patients who additionally received detailed tertiary care and bundled nutritional interventions. The clinical data (age, gender, surgical method, clinical staging, chemotherapy regimen, histories of diabetes, hypertension, smoking, alcohol consumption, time to first flatus and bowel movement, time to first liquid intake, length of hospital stay, complications at discharge, PG-SGA score, and QLQ-C30 score) and lab indices (serum albumin (ALB), prealbumin (PA), transferrin (TRF), hemoglobin (Hb), immunoglobulin A (IgA), M (IgM), and G (IgG)) were compared between the two groups. Results: Study group had significantly higher levels of ALB, PA, TRF, Hb, IgA, IgM, and IgG compared to the control group after intervention (all $P<0.001$). QLQ-C30 score was higher while PG-SGA score was lower in the study group (both $P<0.01$). Postoperative digestive system recovery was faster in the study group, as evidenced by a shorter time to first anal defecation, bowel movement, liquid food intake, and hospital stay ($P<0.001$). Complication rate was significantly lower in the study group ($P<0.05$). Cox regression analysis showed age ($P=0.021$) and clinical stage ($P=0.039$) as independent prognostic factors, while treatment regimen was not ($P>0.05$). Conclusion: Precision-based tertiary care protocol can improve nutritional status, enhance immune function, and facilitate faster postoperative recovery for gastric cancer patients following gastrectomy, thus greatly improving the quality of life of the patient. However, age and clinical staging, rather than the care protocol, are independent prognostic factors for patients' 1-year survival.

Keywords: Precision-based tertiary care, adjuvant chemotherapy, radical gastrectomy, gastric cancer, nutritional indicators, immune function, quality of life

Introduction

According to World Health Organization (WHO) report, there were approximately 1.08 million new cases of gastric cancer worldwide in 2020, with approximately 760,000 deaths [1]. These figures indicate that new gastric cancer cases accounted for 5.6% of all cancer diagnoses and 7.7% of deaths, ranking fifth and fourth among all cancers, respectively [2]. As the most populous country in the world, the cancer situation in China is of great concern. According to data released by the National Cancer Center of China in 2019, there were 3.929 million cases of malignant tumors in China in 2015, with 2.338 million deaths [3]. Among them, about 403,000 cases of gastric cancer were newly diagnosed, accounting for 10.28% of all cancer cases.

Gastric cancer related deaths were estimated to be 291,000, accounting for 12.4% of all cancer-related deaths [4].

While the exact etiology of gastric cancer remains elusive, studies have shown that gastric cancer is closely associated with genetic abnormalities, helicobacter pylori infection, chronic atrophic gastritis, and dietary habits [4]. Alarmingly, the early diagnosis rate for gastric cancer in China is relatively low, accounting for about 10% of all diagnosed cases. This figure is less than one-third of that in Western developed countries, indicating that many Chinese patients are diagnosed at advanced stages [5]. To date, surgery remains the primary and only curative approach for gastric cancer. To ensure complete removal of cancer cells and prevent recurrence, postoperative chemotherapy is crucial [6]. However, due to the combined effects of cancer and chemotherapy drugs, gastrointestinal side effects can severely hamper patients' food and nutrient intake, adversely affecting their overall health and prognosis [7]. After undergoing gastrectomy, patients often face a reduction in food intake due to the reduced stomach tissue and changes in the structure of the digestive system [8]. This structural change impairs the stomach's food storage and digestive functions, further delaying postoperative recovery [9]. Therefore, it is essential to promote patients' self-care awareness and implement appropriate care strategies to optimize their nutritional status. This will not only accelerate recovery, but also significantly improve their quality of life.

In the field of modern medical care, conventional nursing methods are beginning to show their limitations and shortcomings [10]. Traditional models of care are often too generalized, lacking detailed assessment and personalized plans for patients. This one-size-fits-all approach may lead to inadequate or excessive patient care, waste medical resources, or even overlook patients' specific needs, thus affecting therapeutic outcomes [11]. In addition, cancer patients, especially those in peri-operative period, face not only physical challenges but also immense psychological and emotional pressures [12]. Traditional caregiving modalities may struggle to meet these patients' increasing demands for quality of life [13]. Therefore, providing more detailed, comprehensive, and personalized caring services is an urgent issue in the field of nursing. To effectively address these challenges, our team has developed a new care model by combining a refined tertiary care plan (based on problem-oriented quality care + participatory dietary care) with bundled nutritional interventions. This approach emphasizes close patient monitoring and care, with a focus on teamwork, continuous learning, and patient education. By forming bundled care teams, we provide each patient with a scientific, standardized care plan. At the same time, based on the patient's physical and psychological status, we offer specialized nutritional interventions to ensure that patients achieve optimal treatment outcomes and quality of life during the pre- and post-operative and chemotherapy phases.

The purpose of this study is to validate, through practical application and research, the effectiveness of this new model in improving the quality of care and satisfaction of cancer patients. We hope to provide new methods and insights for future nursing practice.

Methods and materials

Ethical statement

This study was approved by the institutional medical ethics committee and adhered to the Declaration of Helsinki.

Patient selection

In this retrospective cohort study, the medical records of 124 patients diagnosed with gastric cancer at the Second People's Hospital of Lanzhou City from June 2020 to May 2022 were reviewed. Of them, 54 patients who received standard care were included in the control group, while 70 patients who additionally received detailed tertiary care and bundled nutritional interventions were included in the study group. **Figure 1** shows the flow of this study.

Inclusion criteria: 1. Patients who were diagnosed with gastric cancer according to treatment guidelines [14]. 2. Patients who had received laparoscopic radical gastrectomy. 3. Patients who had received standardized postoperative care after surgery. 4. Patients with complete postoperative clinical data, including

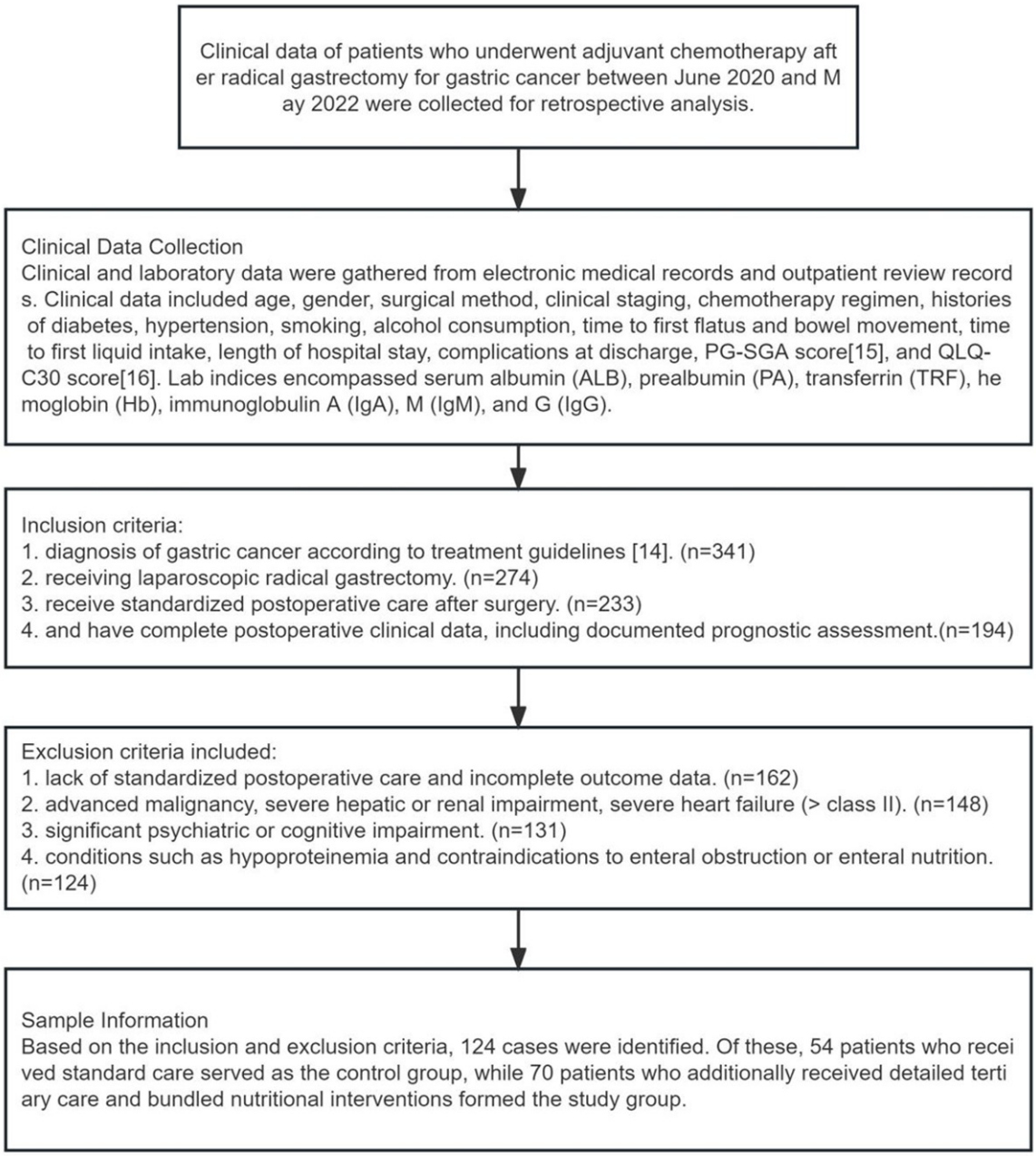

Figure 1. Flow chart of sample screening.

documented prognostic assessment. Exclusion criteria: 1. Patients received no standardized postoperative care or with incomplete outcome data. 2. Patients with advanced malignancy, severe hepatic or renal impairment, severe heart failure (> class II). 3. Patients with significant psychiatric or cognitive impairment. 4. Patients with conditions such as hypoproteinemia and contraindications to enteral obstruction or enteral nutrition.

Clinical data collection

Clinical and laboratory data were gathered from electronic medical records and outpatient review records. Clinical data included age, gender, surgical method, clinical staging, chemotherapy regimen, histories of diabetes, hypertension, smoking, alcohol consumption, time to first flatus and bowel movement, time to first liquid intake, length of hospital stay, complica-

tions at discharge, PG-SGA score [15], and QLQ-C30 score [16]. Lab indices included serum albumin (ALB), prealbumin (PA), transferrin (TRF), hemoglobin (Hb), immunoglobulin A (IgA), M (IgM), and G (IgG). Our institution has incorporated these scores into routine care assessments as part of the standard care process and has systematically recorded this information in the EHRs.

Care plans

Control group: Patients in the control group received problem-oriented quality care, routine postoperative nutrition counseling, parenteral nutrition support via intravenous infusion, and enteral nutrition support via nasogastric tube. Once patients were able to eat orally, they progressed from liquid to semi-liquid and then to soft diets. Other than regular follow-up, no additional interventions were performed. Metrics such as nursing workload, work quality, efficiency, patient satisfaction, health education awareness, and patient quality of life were statistically analyzed.

Study group: Patients in the study group received detailed tertiary care. After gastric cancer surgery, patients received a bundled nutrition intervention and participatory dietary interventions. Initially, a bundled care team, including the head nurse and responsible nurses, was formed. They evaluated the patients' test results and assessed their physical and mental status. When patients awoke from anesthesia, the team informed them of potential pain and provided analgesics. For postoperative nutrition, early enteral and parenteral support was provided, taking into account the patient's body mass index and other nutritional markers. Patients were advised against sputum aspiration during and 30 minutes after enteral feeding. The head of the patient's bed was elevated 30-45° to aid digestion and reduce the risk of reflux. Infusion rates were adjusted based on bowel movements. The nasogastric tube was secured with a Y-shaped tape, and measures such as sips of warm water or orange and cucumber slices were provided for oral comfort. Ambroxol nebulization was used to aid sputum expectoration, as advised by the physician. Personalized diet plans were developed in collaboration with patients and their families. Regular health and nutrition tips were shared through a WeChat group to ensure optimal postoperative recovery and quality of life.

Functional scoring

Patient-generated subjective global assessment (PG-SGA) is a nutritional assessment tool developed for cancer patients. It evaluates nutritional status, identifies risks, and provides individualized nutritional intervention recommendations. Scores range from 0 to 35, with higher scores indicating poorer nutrition. The quality-of-life questionnaire - core 30 (QLQ-C30), developed by European Organization for Research and Treatment of Cancer (EORTC), measures quality of life in cancer patients by assessing various symptoms and functional domains related to cancer treatment. The tool consists of 30 items with individual scores ranging from 1 to 4, with higher scores indicating better functional status.

Indicator assessment

Before surgery and 2 weeks after treatment, fasting venous blood samples were collected, centrifuged, and serum separated. Patients' ALB, PA, and TRF levels were measured using an Olympus AU2700 analyzer with kits from Shengxiang Biotech. IgA, IgM, and IgG levels were determined using a Siemens Pro Spec protein detector with appropriate reagents. Hb levels were determined with a Sysmex XT-1800i.

Quality assurance and control measures

To ensure the integrity and consistency of the implementation of nursing plans, we instituted several quality control measures: Standard Operating Procedures (SOPs) were developed for interventions in both control and study group, detailing every step of the nursing process. Nursing staff were trained according to these SOPs, and proficiency tests were conducted prior to the study to ensure understanding and capability to deliver the intervention accurately. Compliance with SOPs was monitored by periodic audits of nursing documentation, patient charts, and direct observation. Outcomes assessments (PG-SGA and QLQ-C30 scores) were performed by personnel blinded to the patient groupings to mitigate bias. A feedback system was implemented, allowing

Table 1. Baseline information

Factor	Control group (n=54)	Study group (n=70)	χ^2 value	*P*-value
Age			0.595	0.44
≥60	30	34		
<60	24	36		
Gender			0.247	0.619
Male	30	42		
Female	24	28		
Surgical method			0.345	0.557
Total gastrectomy	28	40		
Partial gastrectomy	26	30		
Clinical stage			0.246	0.62
Stage II	20	29		
Stage III	34	41		
Chemotherapy scheme			0.074	0.786
SOX scheme	35	47		
Others	19	23		
History of diabetes			0.503	0.478
Yes	11	11		
No	43	60		
History of hypertension			0.316	0.574
Yes	14	21		
No	41	49		
Smoking history			0.224	0.636
Yes	27	32		
No	27	38		
Alcohol intake history			0.724	0.395
Yes	5	10		
No	49	60		

staff to report deviations from the SOPs, facilitating continuous quality improvement.

Follow-up

Follow-up visits were scheduled every three months, and the one-year survival of patients was documented in electronic pathology record. Factors affecting one-year survival were analyzed using Cox regression.

Outcome measures

Both groups were compared for nutritional indices, immunoglobulins, PG-SGA, and QLQ-C30 scores before and 2 weeks after treatment. Comparisons were made for post-discharge complications, time to first flatus, bowel movements, fluid intake, and length of hospital stay. Cox regression was used to analyze factors influencing one-year patient survival.

Statistical analysis

Data were processed with SPSS26.00 and visualized with GraphPad Prism 9. Chi-squared tests were used to compare categorical data (n (%)), and independent t-tests and paired t-tests were used for comparison of measurement data (mean ± SD) between-group and within-group comparisons, respectively. Cox regression identified independent prognostic factors, and X-tile analysis determined the best cut-off values. Statistical significance was set at P<0.05.

Results

Comparison of baseline data

In this study, we first evaluated the baseline characteristics of patients in two groups. There were no statistical differences in age, sex, type of surgery, clinical staging, chemotherapy regimen, history of diabetes, hypertension, smoking, and alcohol consumption between the control group and the study group (all P>0.05, **Table 1**).

Changes in nutritional indicators before and after nursing

The ALB, PA, TRF, and Hb levels of patients in both groups were measured before and after nursing care. The results showed that there were no statistical differences in ALB, PA, TRF, and Hb levels between the two groups before nursing (P>0.05). After the nursing intervention, ALB, PA, TRF, and Hb levels increased significantly in both groups compared to before (all P<0.001). In addition, the post-intervention levels of ALB, PA, TRF, and Hb were significantly higher in the study group than those in the control group (all P<0.001, **Figure 2**).

Changes in immunoglobulin levels before and after nursing

The IgA, IgM, and IgG levels of patients in both groups were measured before and after breast-

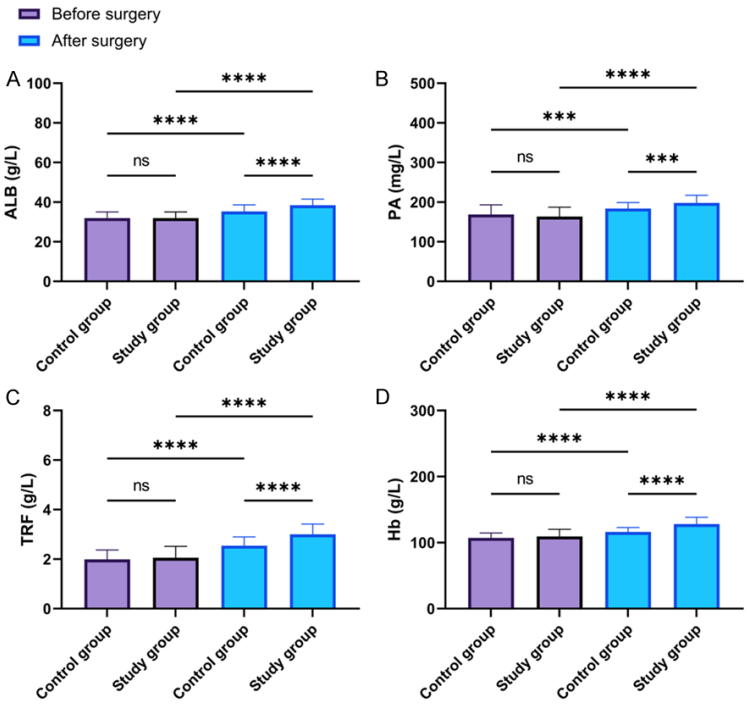

Figure 2. Comparison of ALB, PA, TRF, and Hb levels before and after patient treatment. A. Changes in ALB levels before and after treatment in both groups. B. Changes in PA levels before and after treatment in both groups. C. Changes in TRF levels before and after treatment in both groups. D. Changes in Hb levels before and after treatment in both groups. Note: ALB, serum albumin; PA, prealbumin; TRF, transferrin; Hb, hemoglobin; ns P>0.05, ***P<0.001, ****P<0.0001.

feeding. The results showed no statistical differences in the levels of IgA, IgM, and IgG between the two groups before breastfeeding (all P>0.05). After the intervention, the levels of IgA, IgM and IgG increased significantly in both groups compared to before (all P<0.0001). Notably, the post-intervention levels of IgA, IgM, and IgG were significantly higher in the study group than those in the control group (all P<0.001, **Figure 3**).

Changes in PG-SGA and QLQ-C30 scores before and after nursing

The PG-SGA and QLQ-C30 scores of patients in both groups were evaluated before and after intervention. The results showed no statistical differences in PG-SGA and QLQ-C30 scores between the two groups before nursing (both P>0.05). After nursing intervention, QLQ-C30 scores increased significantly in both groups compared to before (P<0.0001), while PG-SGA scores decreased significantly (P<0.01). In addition, QLQ-C30 scores were significantly higher and PG-SGA scores were significantly lower in the study group after the intervention than those in the control group (both P<0.01, **Figure 4**).

Observation of postoperative recovery of digestive system function

The first anal evacuation time, first defecation time, first liquid diet intake time, and length of hospital stay of both groups were compared. The results showed that all these times were significantly shorter in the study group than those in the control group (all P<0.001, **Table 2**).

Statistics of postoperative complications

The incidence of postoperative complications was analyzed in both groups. The results showed that there were no statistical differences in the occurrence of individual complications between the observation and control groups (P>0.05, **Table 3**). However, the overall incidence of complications was significantly lower in the observation group than that in the control group (P<0.05, **Table 3**).

Prognostic analysis of patients' 1-year survival

Prognostic analysis was performed on the survival of patients one year after treatment. The Cox regression analysis showed that nursing scheme was not a prognostic factor affecting patients' 1-year survival (P>0.05). However, age (HR: 4.356, 95% CI: 1.253-15.136, P=0.021) and clinical staging (HR: 4.753, 95% CI: 1.085-20.821, P=0.039) were identified as independent factors affecting patients' prognosis (**Tables 4**, **5**; **Figure 5**).

Discussion

In our study, we found that the refined tertiary care plus bundled nutritional interventions significantly improved the nutritional status and

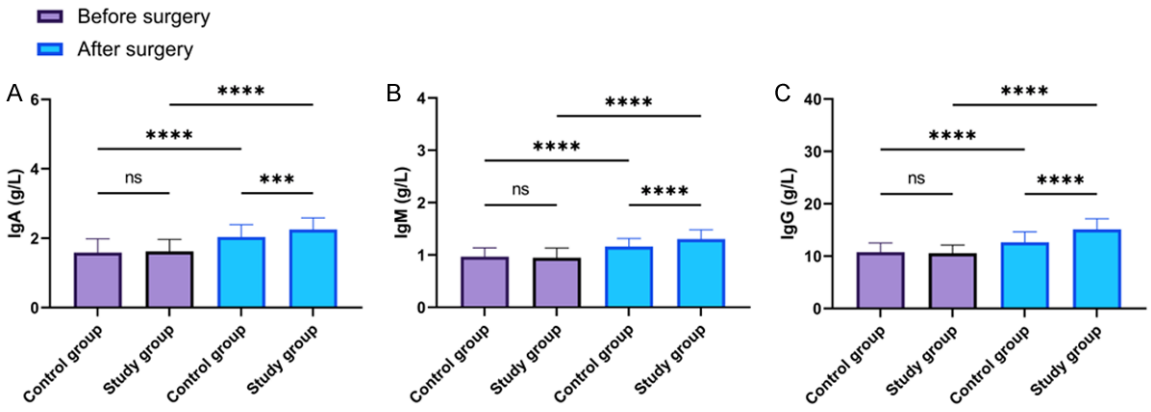

Figure 3. Comparison of IgA, IgM, and IgG levels before and after treatment. A. Changes in IgA levels before and after treatment in both groups. B. Changes in IgM levels before and after treatment in both groups. C. Changes in IgG levels before and after treatment in both groups. Note: IgA, immunoglobulin A; IgM, immunoglobulin M; IgG, immunoglobulin G; ns P>0.05, ***P<0.001, ****P<0.0001.

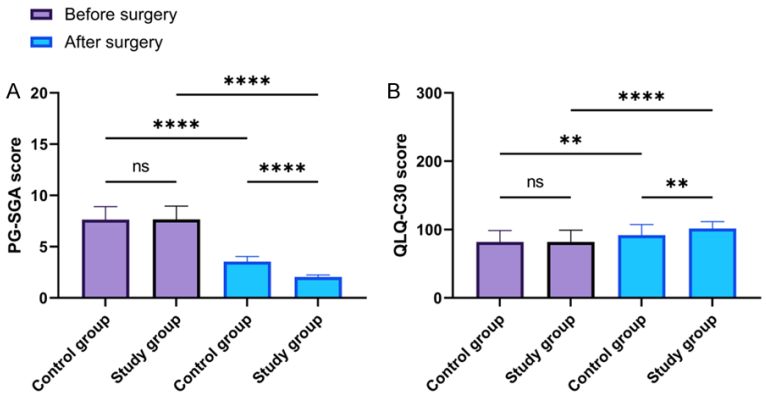

Figure 4. Comparison of PG-SGA and QLQ-C30 scores before and after intervention. A. Changes in PG-SGA scores before and after treatment in both groups. B. Changes in QLQ-C30 scores before and after treatment in both groups. Note: PG-SGA, patient-generated subjective global assessment; QLQ-C30, quality-of-life questionnaire-C30; ns P>0.05, **P<0.01, ****P<0.0001.

quality of life of patients. It also strengthened the patient's immune system and reduced the time it took for the patient's digestive system to recover after surgery. In addition, the postoperative complication rate among patients was significantly reduced. However, the refined tertiary care plus bundled nutritional interventions didn't affect the patients' 1-year survival rate.

The pathogenesis of gastric cancer is complex. Existing studies have identified poor dietary habits and helicobacter pylori infection as risk factors, both of which may promote malignant transformation of gastric mucosal epithelial cells [17]. Malnutrition after radical gastric cancer surgery can lead to tumor escape and organ failure, which are major causes of mortality in gastric cancer patients. Given the changes in digestive function after such surgery, nutritional care is of paramount importance [18, 19]. However, conventional nursing interventions often fall short in supporting nutrition therapies, with nurses merely executing physicians' orders, leading to suboptimal outcomes.

The key benefits of the refined tertiary care plus bundled nutritional interventions lie in its bundled, personalized, and participatory care methods. The establishment of dedicated care teams ensures that patients receive comprehensive and consistent care [20]. The approach emphasizes timely pain management, personalized nutritional support, and implementation of various safety measures. Close collaboration and communication with patients and their families ensure rapid postoperative recovery and improved quality of life. Our research showed that the levels of ALB, PA, TRF, Hb, IgA, IgM and IgG were significantly increased in the study group compared to the control group, while the PG-SGA score was significantly decreased. This indicates the effectiveness of this care model in improving

Table 2. Comparison of postoperative digestive system function recovery time between the two groups

Group	First anal gas passage time (d)	First bowel movement time (d)	First intake of liquid diet time (d)	Hospital stay (d)
Control group (n=54)	1.63±0.52	2.65±0.73	3.87±0.55	18.63±2.18
Study group (n=70)	2.61±0.67	1.84±0.67	2.44±0.53	15.69±1.5
t value	8.934	6.362	14.639	8.891
P value	<0.001	<0.001	<0.001	<0.001

Table 3. Comparison of complication between the two groups

Complications	Control group (n=54)	Study group (n=70)	*P*-value
Lung infection	3	3	>0.999
Reflux esophagitis	4	1	0.168
Anastomotic fistula	2	2	>0.999
Urinary tract infection	1	0	0.435
Duodenal stump fistula	2	1	0.579
Intraperitoneal hemorrhage	1	0	0.435
Total incidence rate	13	7	0.048

Note: Fischer's square test.

patients' nutritional status and immune function. Such a plan provides both personalized and bundled nutritional support to ensure proper caloric and nutrient intake, thereby improving their nutritional status. In addition, timely pain management and personalized nutrition plans could reduce patients' stress and inflammatory responses, thereby promoting recovery of immune function. In addition, close collaboration and communication with patients and their families can potentially improve patients' mental health and motivation, further accelerating physical recovery. Previous meta-studies by Li et al. [21] found that continuous nutritional support effectively improved the postoperative nutritional status of gastric cancer patients with diabetes. In addition, a randomized controlled trial by Xie et al. [22] found that education and nutritional intervention could improve the nutritional status and compliance of gastric cancer patients. These findings are consistent with our results and emphasize the importance of bundled and personalized nutrition and care interventions for gastric cancer patients. Such comprehensive care, especially during the postoperative recovery period, is critical to improving patients' overall health and quality of life.

Our study also compared postoperative digestive system recovery and complication rates between the two groups. First, from the postoperative digestive system recovery observations, patients in the study group had significantly shorter times for first rectal evacuation, first bowel movement, first intake of liquid food, and hospital stay compared to the control group. This means that patients in the study group experienced faster digestive system recovery after surgery. Faster recovery times mean that patients can return to their normal lives and work faster, thereby improving their quality of life. Second, in the postoperative complication statistics, while there was no significant difference in individual complications between the study and control groups, the overall complication rate for the study group was significantly lower. A lower overall complication rate means fewer post-operative health problems and complications, which undoubtedly improves patients' quality of life. Complications not only increase patient discomfort, but can also increase hospital length of stay, medical costs, and recovery time [24, 25]. This further illustrates why patients receiving the refined tertiary care plus bundled nutritional interventions have a higher quality of life than those receiving regular care.

Finally, we analyzed the 1-year survival of the patients. Our research found that the care method did not affect the 1-year survival rate. Although the care plan may have a positive effect on postoperative recovery and quality of life (such as faster recovery of digestive system function and lower complication rate), it doesn't mean that it would directly affect the 1-year survival rate. Survival rates are influenced by several factors, including disease severity, overall patient health, and other complications. The care plan may primarily affect postoperative recovery and quality of life rather than

Table 4. Univariate cox analysis of factors affecting patients' 1-year survival

Factor	β	SE	χ^2	*P* value	HR	95% CI	
						Lower	Upper
Nursing plan	0.512	0.474	1.164	0.281	1.668	0.658	4.228
Age	1.667	0.633	6.940	0.008	5.294	1.532	18.293
Gender	-0.323	0.471	0.470	0.493	0.724	0.287	1.824
Surgical method	-0.756	0.484	2.443	0.118	0.470	0.182	1.212
Clinical stage	1.777	0.750	5.612	0.018	5.913	1.359	25.729
Chemotherapy scheme	-0.251	0.484	0.270	0.603	0.778	0.302	2.007
History of diabetes	-0.582	0.750	0.603	0.438	0.559	0.128	2.430
History of hypertension	-0.006	0.526	<0.001	0.991	0.994	0.354	2.788
Smoking history	0.601	0.484	1.543	0.214	1.823	0.707	4.704
Alcohol intake history	-0.148	0.75	0.039	0.844	0.863	0.198	3.752
ALB	0.119	0.071	2.834	0.092	1.126	0.981	1.294
PA	-0.002	0.010	0.065	0.799	0.998	0.979	1.017
TRF	-0.199	0.545	0.134	0.715	0.819	0.282	2.384
Hb	0.002	0.025	0.005	0.943	1.002	0.955	1.051
IgA	0.128	0.653	0.038	0.845	1.136	0.316	4.083
IgM	-0.523	1.316	0.158	0.691	0.593	0.045	7.816
IgG	0.201	0.137	2.151	0.143	1.223	0.935	1.600
PG-SGA	0.042	0.186	0.050	0.823	1.042	0.725	1.500
QLQ-C30	0.014	0.014	0.995	0.319	1.014	0.987	1.042
First anal gas passage time	-0.546	0.316	2.984	0.084	0.579	0.312	1.076
First bowel movement time	0.038	0.294	0.017	0.897	1.039	0.583	1.850
First intake of liquid diet time	0.204	0.263	0.600	0.439	1.226	0.732	2.055
Hospital stay	0.043	0.098	0.188	0.664	1.044	0.861	1.266

Note: ALB, serum albumin; PA, prealbumin; TRF, transferrin; Hb, hemoglobin; IgA, immunoglobulin A; IgM, immunoglobulin M; IgG, immunoglobulin G; PG-SGA score, patient-generated subjective global assessment score; QLQ-C30, quality-of-life questionnaire-C30.

Table 5. Multivariate cox regression of factors affecting patients' 1-year survival

Factor	β	SE	χ^2	*P* value	HR	95% CI	
						Lower	Upper
Age	1.471	0.636	5.361	0.021	4.356	1.253	15.136
Clinical Stage	1.559	0.754	4.278	0.039	4.753	1.085	20.821

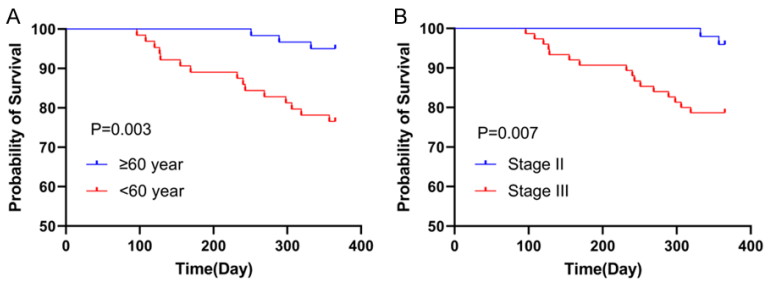

Figure 5. Survival curve of prognostic factors. A. 1-year survival curve for patients of different ages. B. 1-year survival curve for patients at different stages.

directly affecting survival. Age is a common prognostic factor for many diseases, and as age increases, the ability to recover may decrease, along with the potential for other health problems or complications, all of which could affect survival [26]. Clinical staging usually reflects the severity and progression of the disease. A higher clinical stage often indi-

cates more severe disease that may have invaded or metastasized to other tissues or organs [27, 28]. Therefore, clinical staging is an important factor in the prognosis of patients.

Inevitably, our study has several limitations. First, a major limitation is the relatively small sample size. A smaller sample might affect the stability and reliability of statistical results, especially when evaluating the relationships between different variables. In addition, this small sample may limit our ability to assess some rare complications or other unusual outcomes. Second, because patient selection was not entirely random, there may be selection bias, which could affect comparisons between groups, especially if confounding factors were not taken into account. Finally, although we evaluated 1-year survival, we did not examine longer-term survival or other long-term outcomes. Thus, we can't determine the impact of the refined tertiary care plus bundled nutritional interventions on patients' long-term survival or quality of life. Future research should consider increasing the sample size to improve the statistical power and reliability of the results. We could consider randomized clinical trials and continuous patient follow-up to more comprehensively and accurately evaluate the effects of the care plan and provide better treatment and care suggestions for gastric cancer patients.

In conclusion, the refined tertiary care plus bundled nutritional interventions can effectively improve the nutritional status and quality of life of gastric cancer patients, accelerate the recovery of postoperative digestive system function, and significantly reduce the postoperative complication rate. However, the 1-year survival rate remains unaffected by this care plan. It is important to promote the adoption of this refined care plan to improve patients' postoperative recovery, reduce complications, and improve overall quality of life. Future studies are needed to further investigate and validate these findings in larger and more diverse patient populations.

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Disclosure of conflict of interest

None.

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