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ORIGINAL RESEARCH

Effect of Cluster Nursing Based on Multidisciplinary Management Strategy on Perioperative Venous Thromboembolism in Patients with Gastrointestinal Cancers

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Objective: To observe the effect of cluster nursing based on multidisciplinary management strategy in perioperative venous thromboembolism (VTE) prevention and control in gastrointestinal cancer patients.

Methods: A total of 263 gastrointestinal cancer patients admitted to our hospital between January 2022 and September 2023 were included in the study. The patients were stratified into a control group (n=118) and a quality improvement group (n=145). Routine nursing care was administered to the control group, while the quality improvement group received cluster nursing based on multidisciplinary management strategy.

Results: The total incidence of VTE in the quality improvement group (11.7%) was significantly lower compared to the control group (26.3%). The correct rate of VTE assessment by nurses in the quality improvement group stood at 80.0%, significantly surpassing the control group rate of 61.0% ($p < 0.001$). The timeliness rates of VTE assessment within 24 hours of admission, before, and after surgery were 91.7%, 95.2%, and 95.9%, respectively, in the quality improvement group, as opposed to 89.8%, 86.4%, and 87.3% in the control group, indicating a significant improvement in timeliness rates before and after surgery (all $p < 0.05$). The quality improvement group demonstrated a significant increase in both the implementation rate of health education and VTE preventive measures (all $p < 0.05$).

Conclusion: Cluster nursing based on multidisciplinary management strategy has the potential to significantly decrease the incidence of perioperative VTE in patients with gastrointestinal cancer and improve awareness of VTE prevention and treatment among both medical professionals and patients.

Keywords: venous thromboembolism, gastrointestinal cancer, cluster nursing, multidisciplinary management

Introduction

Venous thromboembolism (VTE) comprises deep vein thrombosis and pulmonary thromboembolism. VTE often presents without warning signs and carries a high mortality and disability rate. Besides inflicting substantial physical and psychological distress on patients, severely impacting their quality of life, VTE can also incur economic burdens and elevate overall mortality rates. Across all age demographics, cancer patients face a higher risk of VTE compared to non-cancer patients.[1] Recent studies have noted that the risk of VTE in cancer patients is increasing steadily and is ninefold higher than in the general population.[2] VTE ranks as the second leading cause of death among patients with malignant cancers, following the cancer diagnosis itself.[3] Over the past two decades, the risk of VTE among cancer patients has tripled, presenting a ninefold higher risk compared to the general population. Cancer patients with VTE exhibit mortality rates 2–3 times higher than those without VTE. The risk of thrombosis varies depending on the cancer type, with patients diagnosed with pancreatic cancer, gastric cancer, lung cancer, or primary brain cancer facing the highest risk. Cancer patients undergoing surgery face a markedly higher risk of perioperative VTE compared to patients undergoing surgery for nonmalignant conditions.[4]

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Gastrointestinal cancers represent a prevalent malignant disease characterized by high incidence and mortality rates. Clinically, radical resection stands as the preferred treatment for gastric and intestinal cancer. Post-surgical VTE risk assessment in gastrointestinal cancer patients often yields high-risk and ultra-high-risk scores, characterized by prolonged immobilization, reduced lower extremity venous blood flow, and disease- and surgery-induced activation of coagulation cascades. These factors increase the likelihood of VTE occurrence, underscoring the paramount importance of preventive measures in patients.[5] Given the high incidence of malignant digestive cancers in China,[6] reinforcing nursing interventions for VTE prevention holds crucial clinical significance.

Cluster nursing was initially introduced by the American Health Research Institute as a collection of nursing interventions designed to tackle complex clinical issues characterized by multiple influencing factors and inherent challenges in resolution. Since the inception of the cluster care concept, owing to its rationality, systematic approach, and effectiveness, it has been implemented across various diseases within the academic community.[7–10] Cluster nursing, rooted in multidisciplinary management strategy, transcends a mere amalgamation of clinical nursing interventions; its formulation mandates robust support from evidence-based theory and clinical evidence. Presently, clinical nurses predominantly rely on primary nursing for managing perioperative VTE. While the occurrence of VTE is heavily contingent upon preventive measures implementation, the optimal evidence-based approach for perioperative VTE prevention in gastrointestinal oncology patients remains elusive. Several studies have demonstrated that applying evidence can enhance nurses' adherence to evidence-based practice, consequently elevating the quality of clinical care.[11] The practical application of the best evidence in clinical practice has emerged as an urgent challenge. The prevention and risk management of VTE necessitates multidisciplinary involvement, particularly for oncology patients undergoing surgical treatment, demanding vigilant oversight from medical staff across the entire continuum, spanning from admission to surgery to post-discharge. Recent studies have shown some remarkable results in comprehensive VTE prevention and treatment with multidisciplinary involvement.[12,13] On the clinical frontline, nurses, crucial implementers of medical decision-making, must collaborate closely with clinicians, ultrasonographers, rehabilitation therapists, and patients to seek and apply clinical evidence, thus establishing an effective VTE prevention and management system centered on cluster care and multidisciplinary participation. Thus, the nursing team must make precise and effective clinical decisions guided by evidence and a multidisciplinary approach to minimize perioperative VTE risk.

The objective of this study is to establish an early warning system for VTE during the perioperative period of gastrointestinal cancer, devise multidisciplinary management strategies, and enhance early warning and risk management for perioperative complications in patients. This endeavor aims to bolster nursing efficiency and mitigate nursing risks. The results showed that the implementation of cluster nursing strategies can significantly reduce the incidence of venous thromboembolism in patients with gastrointestinal tumors after surgery. In comparison to traditional nursing approaches, the establishment of a scientifically grounded and objective VTE prevention quality monitoring system for gastrointestinal cancer patients notably enhances awareness among medical staff and patients regarding VTE prevention during the perioperative period of gastrointestinal cancer. Simultaneously, it enhances nursing staff's subjective resilience to risks, elevates the quality of nursing care, and augments patient satisfaction levels.

Data and Methods

General Information

This study comprised a comparative retrospective cohort analysis of patients undergoing laparotomic or laparoscopic gastrointestinal cancer resection at the Department of Gastrointestinal Surgery, Second Affiliated Hospital of Wenzhou Medical University, Zhejiang Province, China, spanning from January 2022 to September 2023. Patients were stratified into two groups: a control group and a quality improvement group, depending on the implementation of VTE quality improvement measures. The outcomes included the incidence of VTE, the rate of correct VTE assessment, timeliness rate of VTE assessment, the rate of implementation of VTE health education, and implementation rate of VTE preventive measures.

The inclusion criteria were delineated as follows: 1) patients admitted to the hospital for surgery and aged ≥18 years; 2) Patients possessed normal communication abilities; 3) patients' family members were able to cooperate with the relevant nursing care, research protocols, and provided signed informed consent; 4) complete clinical data were

available.;5) TNM stages I–III; 6) No history of anticoagulation therapy within 3 months prior to surgery; and 7) Absence of neoadjuvant chemoradiotherapy.

The exclusion criteria were delineated as follows: 1) history of antithrombotic therapy within the last 3 months; 2) concurrent serious organ diseases including heart, liver, lungs, and others; 3) Cognitive disorders such as mental disorders; 4) Contraindications to drug or physical VTE prevention; 5) Patients receiving heparin, low-molecular-weight heparin, or oral anticoagulants; 6) Automatic discharge or patient transfer.

The control group received conventional nursing, while the quality improvement group received cluster nursing based on risk management strategy.

Research Methods

Control Group

Control patients underwent assessment within 24 hours of admission using the Caprini Thrombotic Risk Factor Assessment Scale to evaluate VTE risk during hospitalization.[14] Nurses typically recorded the results using a paper score sheet, followed by the implementation of preventive measures based on the risk assessment outcomes. Patients identified as low-risk received reminders from nurses regarding dietary instructions, lower extremity elevation, ankle pump exercises, early mobilization, and the use of gradient compression stockings and intermittent inflation compression devices. Those categorized as moderate-risk received physical prophylaxis and anticoagulant therapy. Patients at risk of bleeding were prioritized for physical prophylaxis. Individuals identified as high or very high risk promptly received anticoagulants and physical prophylaxis. Nurses intensified safety protocols and conducted comprehensive health education for patients and their families.

Quality Improvement Group

Building upon the control group, the quality improvement group implemented cluster nursing intervention guided by the principles of risk management and evidence-based practice. A multidisciplinary team was assembled to conceive and execute a comprehensive quality improvement initiative for perioperative VTE in gastrointestinal cancer patients. This initiative encompassed staff-led, patient-centered, and department-wide efforts aimed at reducing VTE incidence, enhancing patient experience, and minimizing hospital costs. The VTE nursing team comprised a chief physician, a resident, multiple nurse practitioners, pharmacists, and sonographers. Training for the multidisciplinary management team included VTE-related knowledge sessions conducted via group lectures and regular assessments, multidisciplinary discussion meetings, VTE case reviews, and the establishment of multi-channel healthcare communication pathways. Each team member possessed a minimum of 5 years of professional experience. In accordance with VTE-related guidelines and research findings, the team devised a perioperative VTE prevention and control system (Figure 1) incorporating specific cluster nursing measures based on risk management strategies tailored to the hospital's unique circumstances, as outlined below:

Perioperative VTE Risk Assessment Measures

(1) VTE risk assessment was conducted collaboratively by doctors and nurses, establishing standards and processes, and regularly verifying the timeliness and accuracy of assessments by nurses.
(2) The attending physician and the nurse in charge conducted VTE risk assessment and evaluated bleeding risk for patients using the Caprini Risk Assessment Scale within 24 hours of admission to the hospital (accessible via the electronic medical record system).
(3) The attending physician and the nurse in charge reassessed the patient's VTE risk prior to surgery using the Caprini Risk Assessment Scale.
(4) The attending physician and the nurse practitioner in charge reassessed the patient's VTE risk using the Caprini Risk Assessment Scale within 6 hours of the patient's surgery.
(5) Immediately after admission, the attending physician shall order ultrasound examinations of both lower extremities to assess for bilateral DVT; meanwhile, the charge nurse must monitor the results.

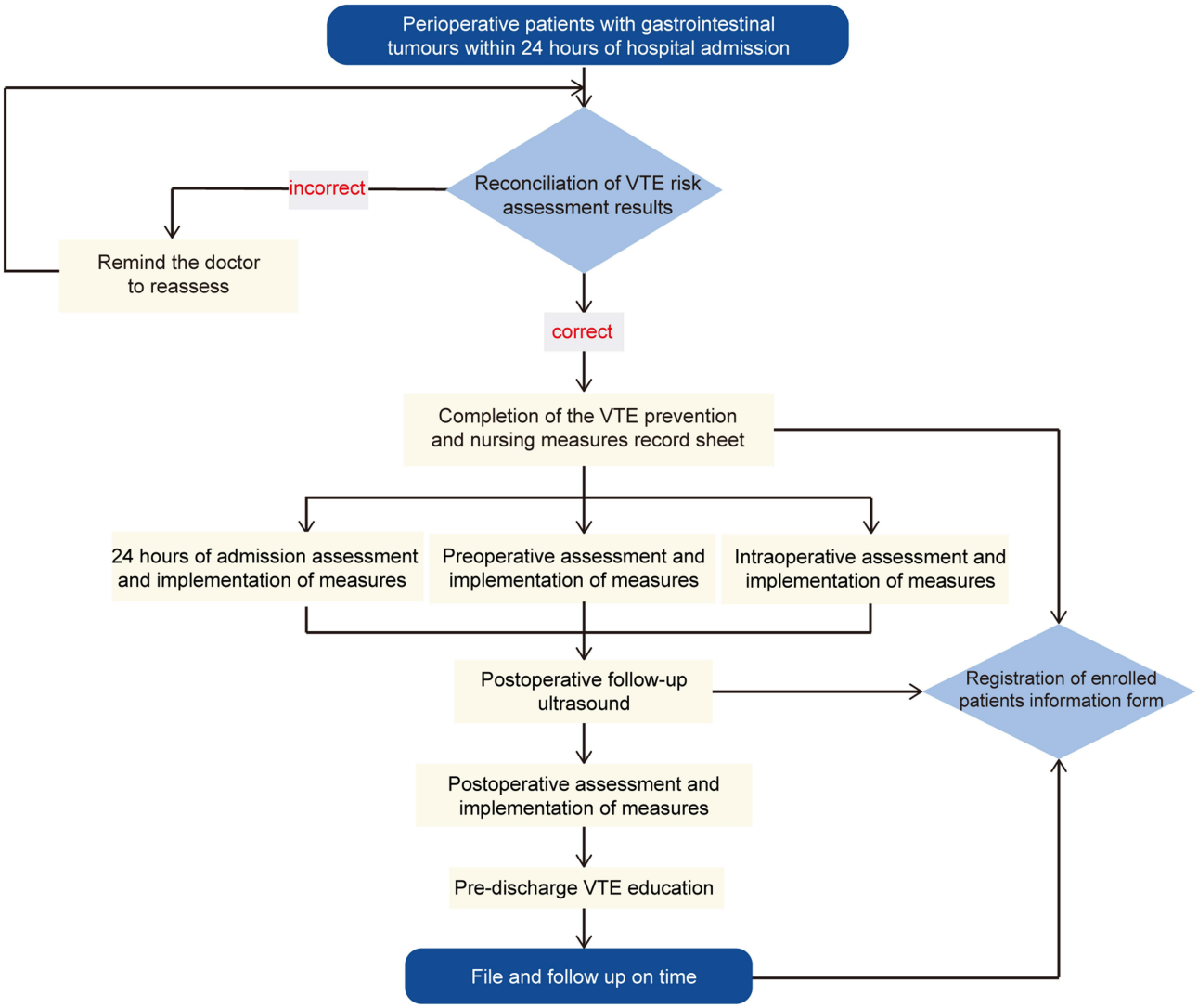

Figure 1 Perioperative VTE prevention and control system working model.

(6) Postoperative orders issued by the physician must encompass a bedside ultrasound examination of both lower extremities. If the patient returns to the hospital room before 14:00, the examination will be conducted on the same day; otherwise, it will be completed as early as possible on the following day.
(7) The D-dimer test must be conducted before surgery and repeated every three days following surgery.

Implementation of Measures Related to Basic Prevention and Physical Prevention

(1) The nurse-in-charge provided health education on basic and physical prevention of VTE to the patients throughout their admission until discharge.
(2) The nurse in charge instructed patients regarding basic prevention and physical prevention of VTE both before and after surgery.
(3) Preoperative fasting was to ensure adequate patient hydration.
(4) The attending physician issued reasonable medical orders and implemented preventive measures according to the patient's Caprini score and bleeding risk.
(5) If there are no contraindications to mechanical prophylaxis, commence compression stockings/pneumatic pumps as soon as possible after obtaining preoperative/postoperative ultrasound results.

(6) Measure leg circumference according to the instruction manual, select the appropriate compression stockings, and provide education on their proper use and maintenance.

VTE Risk Management Measures

1. Setting up risk warning alerts for high-risk groups of thrombosis in gastrointestinal oncology patients and ensuring that there are eye-catching alerts for patient ward-operating room-rescue room-ward handover.
2. Provided perioperative patients using anticoagulants in the department with relevant information and an "anticoagulation reminder card" specific to their treatment. Advised them to carry their "anticoagulation alert card" at all times when they went out for check-ups.
3. Set up an adjustable VTE thrombus risk warning sign at the bedside.
4. Provided VTE Risk Warning Wristbands; add VTE Warning Labels to medical record cards of high-risk patients.
5. Anticoagulant alert cards for patients taking anticoagulants.

Intraoperative VTE Prevention

1. In the preoperative waiting area, patients are shown a video on VTE-related preventive measures and instructed to learn from it.
2. An additional nursing measures record sheet for patients at high risk of thrombosis is provided, with the traveling nurse assigned to the intraoperative measures section.
3. Roving nurses implemented warming measures for patients during surgery.
4. Roving nurses elevated the lower extremities of patients diagnosed with gastric cancer during surgery.
5. Anesthesia resuscitation nurses utilized thermal blankets to prevent postoperative hypothermia while resuscitating gastrointestinal cancer patients in the recovery room.
6. Anesthesia resuscitation nurses instructed patients with gastrointestinal cancer to move both lower limbs at an early stage of resuscitation.
7. The use of an air pump during surgery in patients without contraindication for mechanical prophylaxis was prescribed by the doctor in charge and executed by the visiting nurse.
8. Retention of deep veins on the right side during surgery.

Postoperative VTE Prevention

1. After gastrointestinal cancer surgery, patients received the same physical and pharmacological prophylaxis as the control group based on risk level, thrombotic risk assessment, ankle pump exercise, gradient compression stockings, intermittent inflation compression devices, early activity, chlorohexane injection, and bleeding assessment.
2. Health education brochures and videos were produced to provide information from the patient's point of view, covering the etiology and risk of VTE in gastrointestinal surgery, the impact of VTE on postoperative recovery, the pros and cons of VTE prevention and control, and how to manage postoperative abdominal incision pain during recovery.
3. Nurses demonstrated and instructed patients in performing ankle pump exercises, straight leg raising, wearing compression stockings during their stay at home, and informed them about the dose and duration of oral anticoagulants along with a series of home preventive measures. These measures cover the patient's postoperative period as well as post-discharge follow-up.

Outcomes

The outcomes included the incidence rate of VTE, timeliness rate of VTE assessment, the correct rate of VTE assessment, implementation rate of VTE health education, implementation rate of VTE preventive measures, and the mastery of VTE knowledge by the nurses.

As VTE typically occurs on the third day after gastrointestinal cancer surgery, we performed lower limb color Doppler ultrasound examination prior to and on the first, second, and third days after surgery. The color Doppler examination was conducted by two radiologists from the VTE Quality Improvement Group, comprising a senior radiologist and a deputy director of the department, both having over six years of experience in lower limb venous

thrombosis screening. The external iliac vein, posterior tibial vein, popliteal vein, deep femoral vein, calf veins, and other lower limb veins were examined. The incidence rate of VTE was calculated as the number of VTE cases divided by the total number of cases included in the study.

The correct rate of VTE assessment was determined by reviewing the nursing record forms to verify the patients' venous thromboembolism assessment results in conjunction with the Doppler ultrasound diagnosis. It was calculated as the number of correctly assessed cases divided by the total number of cases, multiplied by 100%.

The timely rate of VTE assessment was defined as the number of times the thrombus risk assessment was completed within 24 hours of admission/before/after surgery, divided by the number of times the nurses were expected to complete the thrombus risk assessment within 24 hours of admission/before/after surgery, multiplied by 100%.

The implementation rate of health education was calculated as the number of cases in which the content of health education was actually applied, divided by the total number of cases.

The implementation rate of VTE preventive measures was determined by the number of cases in which prophylaxis was applied on the first to third day after surgery, divided by the total number of cases.

Statistical Methods

The data were analyzed using SPSS software version 22.0 (SPSS Inc., Chicago, IL, USA). Continuous data were presented as mean ± standard deviation and analyzed using Student's *t*-test. Categorical data were presented as frequencies and percentages and analyzed using the chi-square test. Statistical significance was defined as a p-value < 0.05.

Results

Comparison of Clinical Data Between the Two Groups of Patients

No significant differences were found in the gender ratio, age, BMI, education, smoking history, drinking history, hypertension, hyperlipidemia, diabetes, marital status, or surgical method between the two groups of patients ($p > 0.05$), indicating comparability. These results are summarized in Table 1.

Table 1 Characteristics of the Patients in Two Groups

Item	Control Group (n = 118)	Quality Improvement Group (n = 145)	P value
Sex, n (%)			0.943
Male	64 (54.2)	78 (53.8)	
Female	54 (45.8)	67 (46.2)	
Age (years), mean ± SD	63.2±12.9	64.6±11.7	0.364
BMI (kg/m^2), mean ± SD	22.8±2.78	22.3±2.77	0.128
Education, n (%)			0.584
Junior middle school and below	34 (28.8)	50 (34.5)	
Senior high school and technical secondary school	60 (50.8)	70 (48.6)	
Junior college and undergraduate and above	24 (20.3)	25 (17.2)	
Marital status, n (%)			0.425
Living with a spouse	89 (75.4)	103 (71.0)	
Unmarried, widowed or divorced	29 (24.6)	42 (29.0)	
Smoking history, n (%)	18 (15.6)	23 (15.9)	0.893
Drinking history, n (%)	21 (17.8)	37 (25.5)	0.133
Hypertension, n (%)	35 (22.7)	58 (40.0)	0.081
Hyperlipemia, n (%)	24 (20.3)	34 (21.9)	0.794
Diabetes, n (%)	22 (18.6)	32 (21.3)	0.586
Surgical method, n (%)			0.319

(*Continued*)

Table 1 (Continued).

Item	Control Group (n = 118)	Quality Improvement Group (n = 145)	P value
Radical resection of gastric cancer	54 (45.8)	56 (38.6)	
Radical resection of colon cancer	28 (23.7)	46 (31.8)	
Radical resection of rectal cancer	36 (30.5)	43 (29.7)	

Comparison of the Total Incidence Rate of VTE Between the Two Groups and the Incidence Rate of VTE in Different Cancers

In the control group, the total incidence rate of VTE was 26.3%. Specifically, the incidence rate of VTE for rectal cancer was 25.0%, for colon cancer was 21.4%, and for gastric cancer was 29.6%. In contrast, the total incidence rate of VTE in the quality improvement group was 11.7%, with corresponding rates for rectal cancer, colon cancer, and gastric cancer being 11.6%, 10.9%, and 12.5% respectively. The total incidence rate of VTE in the quality improvement group was significantly lower than that in the control group ($p < 0.05$), as depicted in Figure 2.

Comparison of the Timeliness Rate of VTE Risk Assessment and the Correct Rate of VTE Risk Assessment Between the Two Groups

The timeliness of VTE assessment was improved in the quality improvement group compared to the control group. Moreover, nurses in the quality improvement group showed a significant improvement in the correct rate of VTE assessment before and after surgery. These differences were statistically significant ($p < 0.05$), as shown in Table 2.

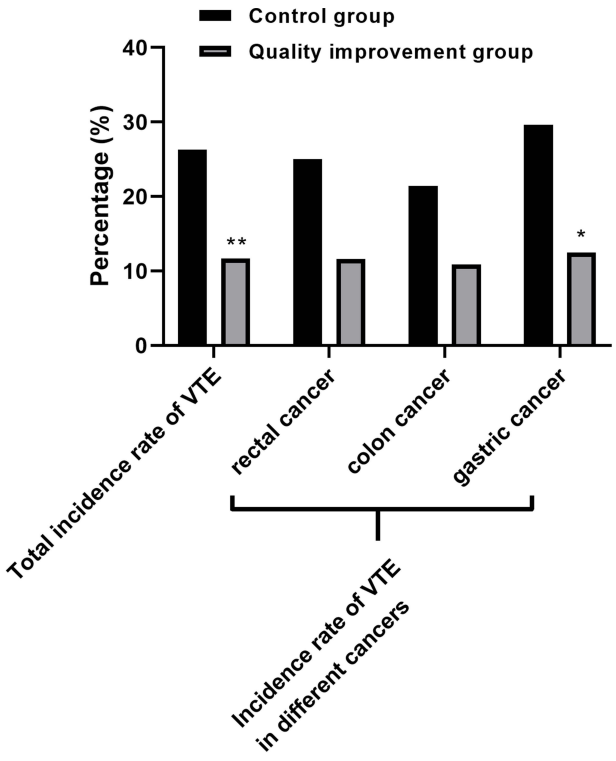

Figure 2 Comparison of the total incidence rate of VTE between the two groups and the incidence rate of VTE in different cancers. Compared with the control group, *$P < 0.05$, **$P < 0.01$.

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Table 2 Comparison of the Accuracy of VTE Assessment by Nurses, and Timeliness Rate of VTE Assessment Between the Two Groups

	Control Group (n=118)	Quality Improvement Group (n=145)	P value
Correct rate of VTE assessment of nurse evaluation, n (%)	72 (61.0)	116 (80.0)	< 0.001
Timeliness rate of VTE assessment, n (%)			
24 hours after admission	106 (89.8)	133 (91.7)	0.5958
Before surgery	102 (86.4)	138 (95.2)	0.0127
After surgery	103 (87.3)	139 (95.9)	0.0107

Table 3 Comparison of Implementation Rate of VTE Health Education and Compliance with Postoperative Prevention Measures in the Two Groups

	Control Group	Quality Improvement Group	P value
Implementation rate of health education, n(%)			
24 hours after admission	72 (61.0)	122 (84.1)	<0.0001
Before surgery	91 (74.0)	124 (85.5)	0.0182
After surgery	97 (82.2)	132 (91.0)	0.0337
After hospital discharge	60 (50.9)	119 (82.1)	<0.0001
Implementation rate of VTE preventive measures, n (%)			
Postoperative day 1	86 (72.9)	124 (85.5)	0.0111
Postoperative day 2	89 (75.4)	125 (86.2)	0.0255
Postoperative day 3	86 (72.9)	126 (86.9)	0.0042

Implementation Rate of VTE Health Education and Compliance with Postoperative Prevention Measures in the Two Groups

Following quality improvement, the implementation rate of health education for perioperative patients with gastrointestinal cancers increased in the VTE co-management group, and the adherence scores to postoperative prophylaxis were higher in the quality improvement group than in the control group. These differences were statistically significant ($p < 0.05$), as shown in Table 3.

Discussion

Given its relative commonality and severity as a complication following gastrointestinal cancer surgery, early identification of risk factors leading to venous thromboembolism, coupled with active prevention measures, may mitigate its occurrence. Therefore, the objective of this study was to establish a perioperative venous thromboembolism early warning and control strategy incorporating multidisciplinary co-management with a focus on cluster nursing, and to evaluate its efficacy in patients undergoing gastrointestinal cancer surgery. Our findings suggest that the co-management cluster care early warning strategy is associated with a decrease in the incidence of VTE in patients undergoing surgery for gastrointestinal cancers and enhances the level of expertise of healthcare professionals in VTE prevention.

Surgery constitutes the primary method for the treatment of gastrointestinal cancers. The trauma induced by surgery can lead to an increase in the release of tissue factor, which activates endogenous coagulation pathways and inhibits the fibrinolytic system, resulting in local blood coagulation and subsequent development of deep vein thrombosis. In addition to these factors, slow venous blood flow in the lower extremities further exacerbates the high risk of postoperative thrombosis in cancer patients as a result of patients being bedridden after surgery.[15,16] For patients undergoing general and abdominopelvic surgery, the risk of VTE varies according to patient-specific and procedure-specific factors. Procedures with relatively low risk comprise laparoscopic cholecystectomy, appendectomy, transurethral resection of

the prostate, inguinal herniorrhaphy, and unilateral or bilateral mastectomy.[17,18] The risk of VTE is highest in patients undergoing abdominal or pelvic surgery for cancer.[17,19,20] Patients with gastrointestinal cancers have specific factors contributing. Preoperative clinical assessment constitutes the first step in perioperative risk assessment for patients with gastrointestinal cancers and is frequently overlooked. This process requires collaborative communication between doctors and nurses, as well as ancillary departments, to gain a comprehensive understanding of the patient's risk of VTE and to adequately assess and address modifiable risk factors prior to surgery. In our study, a series of measures was implemented, including pneumatic pump therapy, padding of both lower extremities, comprehensive monitoring of compression stocking use, and provision of warmth during surgery to maximize the prevention of VTE at a physical level. In terms of pharmacologic prophylaxis, both the control and quality improvement groups adhered to the 2022 clinical practice guidelines.[21] In a meta-analysis of cancer patients undergoing major abdominopelvic surgery, various methods of thromboprophylaxis were compared, and intermittent insufflation plus low molecular heparin emerged as the most suitable for preventing venous thromboembolism, as reported in one study.[1] Thus, based on this finding, and considering the specific conditions of patients, the quality improvement group mostly utilized intermittent inflation plus compression plus low molecular heparin to prevent VTE. Our findings revealed that the incidence of postoperative VTE was elevated in gastric cancer patients compared to rectal cancer and colon cancer based on the categorization of cancer types. Moreover, the incidence of VTE in gastric cancer patients was most significantly decreased by a series of quality improvement measures. Furthermore, there was a very significant decrease in the overall VTE incidence rate.

In recent years, clinical practice guidelines have systematically reviewed evidence from numerous clinical trials and concluded that the appropriate use of VTE prophylaxis in postoperative patients is safe and effective.[22] However, despite advancements, the overall incidence of VTE remains high.[7] Multiple audits from around the world indicate that primary venous thromboembolism prophylaxis is underutilized.[22] This is attributed to healthcare providers lacking sufficient awareness of VTE prevention in cancer patients and failing to establish a set of effective and cost-effective VTE risk management measures. To address this, we established a VTE quality improvement team with the dual purpose of providing early warning and risk management of VTE, as well as strengthening VTE health education for healthcare workers, patients, and their families, aiming to reduce the incidence of VTE. Although the relationship between VTE and cancer is well known, patient awareness of VTE risks and warning signs remains low, highlighting the need for increased patient education and awareness. Oncologists, oncology nurses, and other healthcare professionals within the oncology team should ensure that patients possess at least a basic understanding of VTE warning signs. Further education can assist patients in distinguishing between symptoms secondary to underlying disease, treatment, and other potential causes. Unless asked directly, patients may not report new symptoms as they mistakenly believe they are a manifestation of cancer or an adverse reaction to treatment. A good medical history and ongoing communication with the healthcare team can help ensure effective communication to promote patient understanding.

In this study, the implementation rate of VTE preventive measures for patients in the quality improvement group, as well as the timeliness and accuracy of VTE assessment for patients by nursing staff, were significantly improved. The effect of the high-quality implementation of cluster nursing based on risk management strategies in the process of perioperative VTE risk management in gastrointestinal tumor patients was verified. Nursing staff can assess the nursing risk by understanding the characteristics of the patient's condition, summarizing the high-risk factors and the advantages and disadvantages of interventions, which can help to improve the quality of clinical nursing and the satisfaction of patients. Simultaneously, through a series of measures of health education and publicity, patients and their families become aware of the risk and prevention of postoperative VTE in gastrointestinal tumors, thus strengthening the prevention of perioperative VTE.

This study still has some limitations. Firstly, this study is a retrospective analysis of the Chinese population, potentially introducing selection and analysis bias. Being a single-center clinical study, it limits the generalizability to different healthcare systems and countries. Additionally, further investigation through multicenter clinical trials is necessary for a comprehensive assessment. Moreover, due to the relatively small sample size, future studies should aim to expand the sample size to enhance the reliability of the findings. Additionally, our future research should prioritize the development of methods to enhance interdisciplinary collaboration, aiming to provide effective personalized prevention and care for perioperative patients with gastrointestinal cancers.

Conclusions

In summary, the management of VTE risk has received widespread attention in recent years, with multidisciplinary teams for VTE prevention and treatment being established in major medical centers around the world, and VTE prevention and treatment practices have gradually been promoted in these centers.[23,24] Reducing the incidence of VTE, ensuring patient safety, and improving the effectiveness of nursing details and the quality of medical care are inevitable trends for the development of healthcare organizations in the future. However, there are limited studies on perioperative VTE in gastrointestinal cancers, and there is no established set of targeted and proven prevention and control guidelines. Building upon the application of venous thromboembolism prevention guidelines, this study aims to establish a more scientific and objective nursing quality monitoring system for venous thromboembolism prevention in gastrointestinal cancer patients through multidisciplinary joint co-management centered on cluster nursing. This approach might be suitable for protecting patients undergoing gastrointestinal cancer surgery from VTE.

Ethics Approval

This study was conducted with approval from the Ethics Committee of The Second Affiliated Hospital of Wenzhou Medical University (No.2022-K-216-02). This study was conducted in accordance with the declaration of Helsinki.

Informed Consent Statement

All study participants or their legal guardian provided informed written consent about personal and medical data collection prior to study enrolment. Written informed consent was obtained from all participants.

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Disclosure

The authors report no conflicts of interest in this work.

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