Effect of Risk-Graded Care Based on Caprini Risk Assessment Model on Postoperative Venous Thrombosis and Health-Related Quality of Life in Elderly Patients with Malignancy

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Abstract: Objective: To investigate the effect of risk-graded care based on Caprini risk assessment model on postoperative deep vein thrombosis and quality of life in elderly patients with malignant tumors.

Methods: Sixty-eight elderly patients with malignant tumors treated by surgery admitted to the Department of Geriatrics of the First Affiliated Hospital of Sun Yat-sen University from April 2021 to September 2021 were selected to be included in the control group and given routine nursing interventions in the geriatrics department, using the Autar deep vein thrombosis risk scale and cluster nursing interventions; Seventy cases of elderly patients with malignant tumors treated by surgery admitted to our geriatric department from October 2021 to 2022 were included in the observation group, and the risk-grading nursing intervention based on the Caprini risk assessment model was used in the observation group on the basis of conventional nursing interventions. The number of cases of deep vein thrombosis, D-II cluster values, average hospitalization days, nursing satisfaction, and quality of life levels were compared between the two groups.

Results: The number of VTE cases and the incidence of VTE in the observation group was 0.43%(3/70) lower than that in the control group (0.89%(6/68)); the average hospital stay in the observation group (13.50$\pm$7.45) was lower than that in the control group (15.16$\pm$10.60) and the D-II aggregation value in the observation group (2.90$\pm$4.32) was lower than that in the control group (4.02$\pm$3.91); with statistically significant differences (P<0.05); the satisfaction scores of communication, safety, guidance, nursing, and nursing techniques in the observation group were (41.70$\pm$4.21), (48.53$\pm$5.12), (38.47$\pm$1.90), (56.77$\pm$3.33), (47.80$\pm$1.68) points, higher than those in the control group (30.11$\pm$8.57), (41.69$\pm$7.95), (31.75$\pm$6.95), (46.87$\pm$7.31), (36.0$\pm$9.0) points, with statistically significant differences (t-values of -10.634 to -2.404, all P<0.05); the post-intervention scores of general health, physical function, physical function, somatic pain, somatic energy, social function, emotional function, mental health, and spiritual change dimensions of quality of life in the observation group were (67.00$\pm$14.95), (65.71$\pm$25.24), (63.21$\pm$21.59), (83.63$\pm$10.65), (74.43$\pm$13.45), (70.71$\pm$20.95), (67.62$\pm$26.60), (62.60$\pm$15.12) and (76.79$\pm$20.11) and scores were higher than the control group's post-intervention scores of (57.50$\pm$19.65), (40.44$\pm$27.33), (43.01$\pm$25.86), (54.57$\pm$15.42), (42.65$\pm$20.08), (56.25$\pm$26.67), (41.18$\pm$28.87), (52.35$\pm$18.86), (66.91$\pm$23.83) scores than the control group after intervention, with statistically significant differences (t-values of -26.878 to 0.989. all P<0.05).

Conclusions: Risk-graded nursing intervention based on the Caprini risk assessment model can effectively reduce the incidence of postoperative VTE in elderly patients with malignancy, improve nursing satisfaction, and enhance the quality of life of patients.

1. INTRODUCTION

Venous thromboembolism (VTE) includes deep vein thrombosis (DVT) and pulmonary embolism (PE), and DVT and PE are manifestations of the same disease in different stages of pathogenesis and different tissues and organs, and are DVT and PE are manifestations of the same disease at different stages of development and in different tissues and organs, and are among the more common perioperative complications and important causes of morbidity and mortality in elderly oncology patients, posing a huge burden to elderly oncology patients worldwide [1-4]. In the United States, the incidence rate of VTE is about 1.17/1000 person-years, with about 350,000 new cases of VTE each year

[5]. The incidence of VTE in China is also gradually increasing. An analysis of data from 90 hospitals in China from 2007 to 2016 found [6] that the hospitalization rate of VTE in China increased from 3.2/100,000 to 17.5/100,000 over the decade; among them, the hospitalization rate of DVT increased from 2.0/100,000 to 105,000, and the hospitalization rate of PE increased from 1.2/100,000 to 7.1/100,000. Although mortality rates for DVT and PE are decreasing, VTE remains the third leading vascular disease causing patient death worldwide [7]. Most of all hospitalized elderly patients, with or without surgery, have at least one and more risk factors for VTE, but the percentage of those who have taken preventive measures is still very low. In China, the risk of VTE in surgical inpatients was 13.9% for low risk, 32.7% for intermediate risk and 53.4% for high risk; in medical patients, it was 63.4% for low risk and 36.6% for high

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risk; and the percentage of those who took reasonable preventive measures was only 9.3% in surgery and 6.0% in internal medicine [8]. Therefore, it is of great clinical practice importance to improve the awareness of VTE risk in elderly patients with malignancy and to take appropriate preventive measures.

Effective VTE prevention in elderly patients with malignancies treated by surgery has become a focus of medical practitioners at home and abroad. In recent years, nursing staff have paid significantly more attention to VTE prevention and control in elderly malignancy patients and play an important role in all aspects of VTE prevention and management [9-10]. The key role played by nurses in prevention as part of the multidisciplinary team for venous thromboembolism prevention is also gradually being recognized [10]. The Caprini risk assessment model is an effective tool for assessing VTE and has an important role in predicting and assessing the risk of postoperative VTE occurrence [11-14]. Risk-graded care analyzes disease influencing factors, predicts possible risks by means of risk assessment, grades risks, makes preventive interventions in advance, improves management processes, strengthens prevention awareness, clarifies management responsibilities, continuously improves quality, standardizes nursing sessions, and ensures nursing safety [15]. In this study, we implemented postoperative risk grading nursing assessment and intervention based on Caprini risk assessment model for geriatric patients with malignant tumors treated by surgery in the geriatrics department, and achieved better results and summarized a complete and feasible risk grading nursing process. It is reported as follows.

2. MATERIALS AND METHODS

2.1. Patients and Clinical Samples

We selected 138 elderly patients with malignant tumors treated by surgery admitted to the geriatric department of The First Affiliated Hospital of Sun Yat-sen University from April 2021 to September 2021. Inclusion criteria: 1. age ≥ 60 years; diagnosis of malignant tumor; 2. meeting the surgical indications; surgical anesthesia was general anesthesia; 3. bed rest time ≥ 24 hours after surgery; 4. able to cooperate with active activity patients back to the ward after surgery; 5. voluntary participation in this study and signed the informed consent form. Exclusion criteria: 1. VTE formation before admission; 2. previous neurological dysfunction caused by cerebral infarction or cerebral hemorrhage; 3. patients with language impairment, hearing impairment or communication

impairment; 4. patients with psychiatric disorders; patients who discontinued treatment or were discharged from the hospital. A total of 68 elderly patients with malignant tumors treated by surgery admitted to our geriatric department from 04 to 09, 2021, (including 18 patients with chest surgery, 20 patients with gastrointestinal surgery, 8 patients with hepatic surgery, 10 patients with orthopedic surgery, 3 patients with neurosurgery and 9 patients with urology surgery) were selected as the control group, and a total of 70 elderly patients with malignant tumors treated by surgery from 10, 2021 to 03, 2022 were selected as the control group. A total of 70 elderly malignant patients treated (including 19 patients with chest surgery, 25 with gastrointestinal surgery, 8 with hepatic surgery, 5 with orthopedic surgery, 3 with neurosurgery and 10 with urology surgery) were the observation group. The general data of the two groups were compared, and the differences were not statistically different (P > 0.05) and were comparable, as shown in Table **1**.

2.2. Methods

2.2.1. Control Group

In the control group, the VET preventive care routine in geriatrics was adopted, and the risk assessment of VTE was performed on postoperative elderly patients using the Autar Deep Vein Thrombosis Risk Assessment Scale, with the following assessment scheme: ≤6 as no risk, 7-10 as low risk (weekly assessment); 11-14 as medium risk (every 3 days assessment); ≥15 as high risk (daily assessment). The patients were also given intensive care measures including: 1, elevation of both lower limbs by 15-30°, no pillow under the popliteal fossa and small retreat; 2, prohibition of puncture and infusion of both lower limbs; 3, early active and passive limb movement in bed, daytime Q2-3h, 15min/time; 4, as early as possible to get out of bed, daytime 4-5 times/day, 15min/time; 5, use of antithrombotic elastic stockings; 6 Observe the skin temperature, color, sensation and arterial pulsation of the distal extremity; 7, drink more water than 2000ml per day if the condition permits; 8, abstain from smoking, eat a low-fat and multi-fiber diet, and keep the bowels open; 9, give anticoagulation therapy: low-molecular heparin, warfarin, etc. as prescribed by the doctor; 10, use intermittent inflatable compression device (IPC) or plantar venous pump (VFP). The nurse-in-charge observed the degree of swelling and movement of the patient's limbs every shift, and reported abnormalities to the doctor in charge in time and immediately followed medical advice for symptomatic treatment.

Table 1: Comparison of General Information between the Two Groups

Group	Number of cases	Caprini Score ($\bar{X}\pm S$)	Smoking history (cases)	History of alcohol consumption (cases	High blood pressure (cases)	Diabetes (cases)	Coronary heart disease (cases)
Control group	68	9.20±1.75	23	15	41	14	8
Observation group	70	8.12±2.78	16	10	37	13	15
Statistical quantities		t=1.467	χ^2=2.046	χ^2=1.405	χ^2=0.776	χ^2=0.089	χ^2=2.319
P		0.155	0.153	0.236	0.378	0.765	0.128

Group	Number of cases	History of Varicose Veins (cases)	With or without central venous cannulation (cases)	VTE medical history (cases)	Whether death occurs during hospitalization (cases)	Use of anticoagulants or not (cases)
Control group	68	5	30	6	1	4
Observation group	70	1	35	5	0	2
Statistical quantities		χ^2=1.661	χ^2=0.479	χ^2=0.133	-	χ^2=0.206
P		0.198	0.489	0.716	0.493	0.650

(Note: "-" is no data).

2.2.2. Observation Group

In the observation group, based on the use of the Autar scale and intensive care measures in the control group, the Caprini scale was also used to assess the risk of VET in 70 patients in the observation group. The assessment model was developed by Caprini [16], a scholar at Northwestern University, and was initially applied to all inpatients in 1991, and after continuous research, a more mature The risk assessment model [16] was first applied to all inpatients in 1991, and after continuous research, a more mature risk assessment model was developed in 2005 [16], in which nurses provide appropriate risk prevention (countermeasures) according to patients' VTE risk stratification. Meanwhile, our research team constructed and used an electronic VTE assessment system in the hospital electronic case system, which electronically implemented the Caprini risk assessment model for continuous, dynamic, and accurate management, forming a trend chart of perioperative VTE risk scores for geriatric malignancy patients in our geriatric department, and dynamically addressing the VTE risk assessment problem.

2.2.2.1. Risk-Graded Nursing Interventions Based on the Caprini Risk Assessment Model

The Caprini risk assessment model was adopted from the Caprini risk model 2009 revision. Referring to the interpretation of the entries of the Caprini risk assessment model in the Expert Consensus on Risk Assessment and Prevention of Venous Thromboembolism in General Surgery Patients [17], the bedside nurses obtained comprehensive and accurate patient disease information by reviewing medical records, consultation, physical examination, and laboratory tests, and performed VTE risk assessment on patients to improve the accuracy and validity of risk assessment results. 1. Assessment criteria: The VTE risk factor score of the Caprini risk assessment model is 1, 2, 3, and 5 points, and the total score is 0 for very low risk, 1 to 2 for low risk, 3 to 4 for intermediate risk, 5 to 8 for high risk, and >8 for very high risk after the summation of the scores. 2. Timing and frequency of assessment: all newly admitted and transferred patients were assessed within 8h; within 2h after surgery on the day of surgery; within 2h for changes in condition; for ≤1 score, no re-assessment was required; for ≥2 score, assessment was performed twice a week; for ≥3 score, assessment was performed in a timely manner according to changes in activity content (at least once every 3 d); and at any time for changes in condition or activity capacity. 3. Implementation of the Caprini risk assessment process: The nurse carries a mobile computer to the patient's bedside, checks the entries that match the patient one by one against the 47 entries of the model, and enters

them into the hospital's medical benefit system. The system automatically calculates the score and grading obtained by the patient, screens out the medium- and high-risk groups, and the system pushes out the risk-graded nursing interventions that need to be implemented according to the risk level for the patient at this assessment level. The nurse-in-charge immediately reports the information of patients at high risk in the Caprini score to the bedside doctor and reminds him to prescribe relevant tests such as vascular ultrasound, D-dimer and coagulation routine, etc. The bedside nurse tracks the test results so that VTE prevention measures can be implemented in a timely manner. Very low risk (0 points) patients: basic preventive measures; low risk (1 to 2 points): basic prevention + physical prevention; medium risk (3 to 4 points): implementationof basic prevention + physical prevention + drug prevention; high risk (5 to 8 points): implementation of basic prevention + physical prevention + drug prevention; very high risk (> 8 points): implementation of basic prevention + physical prevention + drug prevention. 1. Basic prevention measures include: for those who need deep vein placement, subclavian vein or internal jugular vein is preferred, and the placement time should not exceed 14 days; keep the patient elevated after surgery; choose the appropriate venous puncture site, maintain the balance of intake and output, moderate rehydration after surgery, early bed activity, ankle pump exercise, quadriceps functional exercise, bed cycling exercise, passive exercise, etc., and carry out VTE prevention knowledge dissemination; guide Improve lifestyle (daily water intake > 2000mL, quit smoking and alcohol, control blood sugar and blood pressure). 2. Physical prophylaxis mainly includes gradient compression stockings, intermittent inflatable compression pumps and plantar venous pumps, etc. Patients are routinely instructed to wear lower limb compression stockings with a pressure level I [15-21 mmHg (1 mmHg=0.133 kPa)] 1 day before surgery or on the day of surgery [17], and the frequency of basic prophylaxis and physical prophylaxis is increased in patients who cannot use pharmacological prophylaxis. Patients at risk of trauma and anastomotic bleeding after major abdominal surgery, such as liver and pancreas, are given priority in the application of physical prophylaxis [17]. 3. Mechanical prophylaxis is a commonly used method including graduated compression stockings (GCS), intermittentpneumatic compression devices (IPC), and venousfoot pumps (VFPs) [18]. 4. Drug prevention: regular heparin, low-molecular heparin, vitamin K antagonists, and antiplatelet drugs were used as prescribed; when applying needle anticoagulants,

appropriate injection sites were selected and changed regularly [19-20]. At the same time, nursing staff assessed patients for bleeding risk and closely observed patients for bleeding symptoms such as skin and mucous membranes and the occurrence of stress ulcers in the gastrointestinal tract. Focus on the time interval between vascular puncture, placement and extubation and the administration of anticoagulant drugs. Produce a VTE prevention health education brochure, film VTE health education videos for rolling broadcast on the room TV, and produce a VTE prevention health education QR code that patients can scan to watch at any time. Health education on VTE prevention care is provided to patients and their families by bedside nurses during preoperative preparation, on the day of surgery, and on the first day after surgery. Formation of multidisciplinary MDT medical and nursing anti-embolism weibo group. Establish a spreadsheet file of high-risk groups in VTE, make a technical roadmap to form, and responsible nurses remind doctors to improve patient-related examinations and track the examination results so that timely implementation of prevention better implementation of VTE prevention measures.

2.2.2.2. VET Knowledge Training and Assessment

1. Before implementing this program, organize all nurses in our department to carefully study the interpretation of the entries of the Caprini risk assessment model in the 2022 Expert Consensus on Risk Assessment and Prevention of Nursing Care for Venous Thromboembolism in General Surgery Patients [17]; the rules of the Caprini risk assessment model, etc. Chinese Guidelines for Perioperative Thrombosis Prevention and Management in General Surgery" and "Guidelines for Diagnosis and Treatment of Deep Vein Thrombosis (3rd Edition)" to develop a perioperative VET prevention program for elderly patients with malignancy in our department. 2. Conduct regular training and assessment on knowledge and skills related to VET prevention and treatment, emergency pulmonary embolism, etc. to improve nurses' ability to observe the condition of VET prevention and enhance the level of thrombosis care.

2.2.2.3. Quality Control

A quality control team with the nurse manager as the core was established in the ward to regularly conduct corresponding process evaluation and effect assessment of VTE risk assessment, improve the connotation of VTE nursing in the ward through the three-level quality control approach of intra-departmental self-examination - district nurse manager

- department nurse manager quality control, and conduct real-time data analysis, evaluation and assessment of various quality control key indicators through the hospital's nursing cloud management information system, so as to provide timely feedback, dynamic improvement and continuous improvement. Real-time data analysis, evaluation, assessment, timely feedback, dynamic improvement, continuous improvement, and thus realize the whole process and refined VTE risk assessment management.

2.3. Observation Indicators

2.3.1. VTE-Related Signs and Symptoms and Ultrasound Findings

Color Doppler ultrasonography of both lower extremity vessels was performed before the patient's surgery, 3 d and 7 d after surgery, respectively, to determine the presence of VTE formation. Coagulation routine and D-II aggregates were checked at 1 d, 3 d, and 7 d after the patient's surgery, respectively. DVT diagnostic criteria [21]: presence of substantial echoes in the lumen; non-deflatable lumen of the compressed vein; filling defect seen in the luminal blood flow signal; and no phasic changes in the blood flow spectrum. Preoperative to 7 d postoperative observation of VTE-related symptoms, postoperative daily observation of the patient's blood circulation in both lower limbs at 8:00, Homan's sign (straight leg extension ankle test, make the patient's lower limbs extend, forced dorsiflexion of the ankle joint, if there is pain in the calf triceps muscle is positive, suggesting deep vein thrombosis in the lower limbs [21]), Neuhof's sign (gastrocnemius muscle squeeze test, the examination of the patient's gastrocnemius muscle with finger pinch pressure If there is thickening, infiltration or pressure pain, it is positive, suggesting venous plexus of calf muscle or lower extremity vein thrombosis [21]).

2.3.2. Nursing Satisfaction

Patient satisfaction with nursing care was investigated by the Nursing Outcome Classification Satisfaction Scale [22] before patient discharge, covering six dimensions: safety, communication, care, nursing skills, guidance, and environment, using a Likert 5-point scale with scores of 1 to 5 for completely dissatisfied, generally satisfied, moderately satisfied, very satisfied, and completely satisfied, respectively, with higher scores indicating higher satisfaction with nursing care. The Cronbach's alpha coefficient of the scale was 0.957.

2.3.3. Health-Related Quality of Life

The MOS item Short From Health Survey (SF-36) [23-25] was used to assess the Health-Related Quality of Life before and after the intervention (7 d postoperatively) in the 2 groups of patients, which included a total of 8 dimensions of general health, physical function, physical function, social function, mental health, somatic vitality, somatic pain, and emotional function The 12 items were assessed on a percentage scale, with higher scores representing a higher level of Health-Related Quality of Life , and the Cronbach's alpha coefficient of the scale was 0.912.

2.4. Statistical Analysis

SPSS 21.0 software was used for statistical analysis and processing. Count data were described by frequency, and the chi-square test was used for comparison between 2 groups; measurement data were described by mean ± standard deviation, and the t-test was used for comparison between 2 groups, and the paired t-test was used for comparison before and after intra-group intervention. $p < 0.05$ was considered a statistically significant difference.

3. RESULTS

3.1. Number of VTE Cases, Average Hospital Days, and Postoperative D-II Cluster Results during Hospitalization in both Groups

In the observation group, the Doppler ultrasonography results showed 65 cases of patency, 5

Table 2: **Comparison of the Number of Days of Hospitalization, Postoperative D-II Aggregates, and Cases of VTE in the Two Groups (x±s)**

Group	Number of cases	Number of days in hospital (days, $\bar{X}{\pm}S$)	Postoperative D-II aggregates (($\bar{X}{\pm}S$)	Whether VTE occurred during hospitalization (cases)
Control group	68	15.16±10.60	4.02±3.91	6
Observation group	70	13.50±7.45	2.90±4.32	3
Statistical quantities		t=1.063	t=1.594	χ^2 =0.540
P		0.290	0.113	0.463

Table 3:   Comparison of Nursing Satisfaction Scores between the Two Groups (Points)

Group	cases	communication	safety	guidance	Physical Environment	nursing	nursing techniques
Control group	68	30.11±8.57	41.69±7.95	31.75±6.95	24.87±0.45	46.87±7.31	36.00±9.00
Observation group	70	41.70±4.21	48.53±5.12	38.47±1.90	25.00±0.00	56.77±3.33	47.80±1.68
t		-10.034	-6.026	-7.699	-2.404	-10.191	-10.634
P		<0.001	<0.001	<0.001	0.019	<0.001	<0.001

cases of stasis, and 3 cases of VTE, and the incidence of VTE in the observation group was 0.43% (3/70); In the control group, there were 56 cases of patency, 12 cases of stasis, and 6 cases of VTE, and the incidence of VTE in the control group was 0.89% (6/68). The mean number of hospital days in the observation group (13.50±7.45) was significantly lower than that in the control group (15.16±10.60). The postoperative D-II aggregation value in the observation group (2.90±4.32) was significantly lower than that in the control group (4.02±3.91). For details, see Table **2**.

3.2. Comparison of Nursing Satisfaction between the Two Groups

The observation group was more satisfied with communication, safety, guidance, care, and nursing techniques than the control group, and the difference was statistically significant (P<0.05). For details, see Table **3**.

3.3. Comparison of Health-Related Quality of Life between the Two Groups

There was no statistically significant difference in the scores of each dimension of Health-Related Quality of Life between the two groups before the intervention (P>0.05); the scores of each dimension of quality of life were significantly higher in the 2 groups after the intervention, and the difference was statistically significant in the observation group than in the control group (P<0.05). For details, see Table **4**.

4. DISCUSSION

4.1. Elderly Patients with Malignant Tumors at High Risk of VTE after Surgical Procedures

The main reasons for the occurrence of VTE include 1. advanced age: the risk of VTE formation increases significantly when the age is ≥ 60 years, and the risk increases with age. 2. Malignant tumors: VTE

Table 4:   Comparison of Health-Related Quality of Life Scores between the Two Groups (Score)

Group	Number of cases	General health	Physiological functions	Physiological functions	Body pain	Somatic energy	Social Functions	Emotional functions	Mental Health	Spiritual change
Control group	68									
Pre-intervention		48.53±24.25	33.09±26.43	34.93±31.19	42.79±21.26	32.57±25.13	46.88±31.33	29.90±32.14	48.47±19.37	46.69±28.29
Post-intervention		57.50±19.65	40.44±27.33	43.01±25.86	54.57±15.42	42.65±20.08	56.25±26.67	41.18±28.87	52.35±18.86	66.91±23.83
Observation group	70									
Pre-intervention		49.50±23.47	38.57±27.48	35.00±30.52	43.16±21.35	34.07±24.38	46.79±30.07	29.52±33.83	47.09±18.91	46.07±26.11
Post-intervention		67.00±14.95	65.71±25.24	63.21±21.59	83.63±10.65	74.43±13.45	70.71±20.95	67.62±26.60	62.60±15.12	76.79±20.11
t_1		-0.239	-1.194	-0.014	-0.100	-0.355	0.017	0.067	0.425	0.134
P_1		0.812	0.235	0.989	0.920	0.723	0.986	0.946	0.672	0.894
t_2		-3.189	-5.646	-4.987	-12.842	-10.892	-3.536	-5.592	-3.516	-2.627
P_2		0.002	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	0.010
t_3		-9.851	-4.945	-5.661	-7.685	-8.653	-11.113	-5.852	-26.878	-16.836
P_3		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
t_4		-8.885	-14.392	-14.864	-16.846	-15.939	-10.881	-12.173	-7.110	-16.636
P_4		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

(Note: t1, P1: comparison between the 2 groups before intervention; t2, P2: comparison between the 2 groups after intervention; t3, P3: comparison between the control group before and after intervention; t4, P4: comparison between the observation group before and after intervention).

occurrence in patients with malignant tumors is significantly higher than the population average and is related to tumor type. Compared with other tumors, patients with abdominal tumors have a relatively higher risk of postoperative VTE, patients with metastatic cancer and gastrointestinal tract tumors have a higher risk of VTE, and patients with pancreatic cancer gastric VTE have the highest risk of surgical tumors. In addition, the risk of VTE is significantly increased when patients are accompanied by previous history of VTE, family history of VTE, diabetes mellitus, hyperlipidemia, erythrocytosis, bed braking, intravenous placement, and adjuvant radiotherapy [26]. VTE is a common complication in elderly patients with malignant tumors undergoing surgery, and its insidious onset and further development of thrombosis can threaten patients' lives. At this stage, postoperative VTE risk prevention in elderly patients with malignancy has received wide attention from clinical medical personnel.

4.2. Effectiveness of Risk-Graded Care Based on the Caprini Risk Assessment Model in the Prevention of Postoperative VTE in Elderly Patients with Malignant Tumors

The results in this study showed that the incidence of VTE was 0.89% in the control group and 0.43% in the observation group, suggesting that risk-graded care could reduce the incidence of postoperative VTE in elderly patients with malignant tumors; the average number of hospital days in the control group was (15.16$\pm$10.60) days significantly higher than that in the observation group (13.50$\pm$7.45) days, suggesting that risk-graded care could significantly reduce the average number of hospital days in patients; the The D-II aggregation value in the control group was (4.02$\pm$3.91) significantly higher than that in the observation group (2.90$\pm$4.32), suggesting that risk-graded care could significantly reduce the postoperative D-II aggregation values of patients. Because risk-graded care increases the frequency of observation of the postoperative VTE high-risk group of elderly malignant tumor patients, it can detect abnormalities in time, provide systematic health education to patients, and make them actively cooperate with nursing work; encourage early functional exercise and early out-of-bed activities of patients, accelerate the recovery of lower limb venous and lymphatic reflux, reduce blood stasis, and reduce the degree of limb swelling, thus reducing the incidence of VTE and D-II aggregation value. The Caprini risk assessment model provides a standardized and accurate assessment of VTE risk factors in the perioperative period for elderly patients with malignant tumors, and based on the assessment results, more

accurate identification of medium- and high-risk patients and timely adoption of scientific, effective, multidisciplinary and predictive intervention programs can effectively prevent the formation of postoperative VET in patients. Based on clinical experience and extensive evidence, the Caprini risk assessment model is recommended for the postoperative assessment of VTE risk in elderly patients with malignancy, which covers all common risk factors for VTE in hospitalized patients and has been widely used worldwide and validated in the Chinese population. The model can provide assessment criteria to screen patients for VTE risk for risk classification and take appropriate preventive measures for each type of risk classification, which not only effectively reduces the incidence of VTE, but also rationalizes the use of health care resources and provides a reference basis for establishing a sound VTE assessment management system, which has been widely recommended by guidelines [27-29]. Initial practical experience and related studies have shown that the Caprini risk assessment model is an economically feasible, convenient and effective tool for VTE risk prediction and assessment [29].

4.3. Effect of Risk-Graded Care Based on Caprini Risk Assessment Model on Nursing Satisfaction and Health-Related Quality of Life of Elderly Patients with Malignancy

This study evaluated patient care satisfaction in terms of communication, safety, guidance, physical environment, nursing care, and nursing techniques. The results showed that the implementation of risk-graded nursing interventions based on the Caprini risk assessment model was conducive to improving patient satisfaction; the risk-graded care quantified and specified nursing measures, and obtained informed understanding from patients, while focusing on individualized nursing measures, the concept of humanistic care, and The implementation of the risk-graded nursing interventions quantifies, specifies, and obtains informed understanding from patients, while focusing on individualized nursing measures, humanistic concepts, and detailed nursing care; focusing on warm communication in the nursing process, which helps patients affirm the work of nursing staff. Meanwhile, quality of life is a multidimensional concept, which refers to the state of physical, psychological, and social adaptation felt by an individual or group [30]. Elderly patients with malignant tumors have disturbed physical and social functions, severe anxiety and depression, and significantly reduced quality of life levels. The results of this study

show that risk-graded care based on the Caprini risk assessment model focuses on patient health education and nursing humanistic care, which can correct patients' negative emotions in a timely manner, enhance patients' confidence in recovery, improve environmental comfort, and promote patients' rapid recovery, thus improving their quality of life level.

5. CONCLUSIONS

In conclusion, risk-graded nursing interventions based on the Caprini risk assessment model can effectively reduce the incidence of postoperative VTE in elderly patients with malignancy, shorten the length of bed rest and average hospital stay, reduce their D-II cluster values, increase patient satisfaction with nursing care, and improve the quality of life of patients.

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