

Research Article

Application of Nursing Project Management in Increasing the Utilization of GCS in Patients at High Risk for DVT

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Abstract

Objective: To investigate the effect of nursing program improvements on improving the utilization rate of gradient compression stockings in patients at high risk of deep vein thrombosis. **Methods:** To set up a special project improvement group, determine the topic of special project improvement, set 40 patients with postoperative Caprin score >5 before the implementation of special project improvement activities, i.e., from January to May 2022 in our hospital, as the control group, and 40 patients with postoperative Caprin score >5 after the implementation of special project improvement activities, i.e., from July to November 2022 in our hospital as the experimental group, and count the number of patients using gradient compression stockings to prevent deep vein thrombosis, and investigate the effect of using gradient compression stockings in improving the utilization rate of patients with high risk of deep vein thrombosis. The number of patients using gradient compression stockings to prevent deep vein thrombosis, the survey of patients' knowledge about deep vein thrombosis and satisfaction with care, and the comparison of the differences between the two groups before and after the project improvement. **Results:** The use rate of gradient compression stockings in the experimental group was 82.5% higher than that of gradient compression stockings in the control group, which was 15%, with statistically significant differences ($p < 0.05$); the experimental group's knowledge of DVT was higher than that of the control group, with statistically significant differences ($p < 0.05$); and the experimental group's satisfaction with nursing care increased from 91.73 points to 98.75 points, with statistically significant differences ($p < 0.05$). **Conclusion:** Project management can effectively increase the utilization rate of gradient compression stockings for high-risk patients with deep vein thrombosis and improve patients' knowledge of deep vein thrombosis and satisfaction with nursing care.

Keywords

Project Management, Deep Vein Thrombosis, Gradient Compression Stockings

1. Introduction

Deep venous thrombosis (DVT) is a disorder of venous return caused by abnormal clotting of blood in the deep veins, often in the lower extremities. A dislodged thrombus can cause pulmonary embolism (PE), and DVT and PE are col-

lectively known as venous thromboembolism (VTE), which manifests the same disease in different stages. The main adverse effects of DVT are PE and post-thrombotic syndrome, which can significantly affect the patient's quality of life, and

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Received: 7 September 2024; **Accepted:** 25 September 2024; **Published:** 10 October 2024



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even lead to death [1]. Studies have shown that the implementation of scientific and effective nursing preventive measures is essential to reduce the incidence of DVT, alleviate the pain of patients, and promote recovery [2, 3]. Commonly used preventive measures in hospitals include primary prevention, mechanical prevention, and pharmacological prevention, among which mechanical prevention includes intermittent pneumatic compression devices (IPC), gradient compression stockings (GCS), and venous plantar pumps (VFP) [4]. Domestic guidelines point out that mechanical prophylaxis is one of the indispensable measures for DVT prevention, and it is also an auxiliary measure for drug prevention and an alternative measure in case of contraindication to anticoagulant drugs, etc. It has the characteristics of safety, non-invasive, convenient, and reliable, and has fewer complications, and it applies to low-, medium-, and high-risk patients [5, 6]. And domestic and international studies have shown that mechanical prophylaxis is widely applicable and is not affected by the patient's renal function or bleeding risk, making it valuable in clinical application [7, 8]. Mechanical prophylaxis is particularly important for the prevention of DVT in patients who are post-surgical, bedridden, or have a prolonged static state [7]. Researchers in this department combined clinical practice and reviewed relevant literature and found that the current clinical use of gradient compression stockings to prevent deep vein thrombosis is low. The results of a survey on the knowledge, beliefs, and behaviors of healthcare workers on the application of compression stockings in 19 hospitals in 10 provinces of China showed that most of the healthcare workers have positive attitudes towards the application of compression stockings, but they lack the relevant knowledge of the application of compression stockings and their behaviors are lacking, resulting in unsatisfactory preventive effects. and behavioral norms, resulting in unsatisfactory preventive effects [9]. Therefore, to improve the utilization rate of gradient compression stockings for high-risk patients with deep vein thrombosis, this study adopts a project management method, which is reported as follows:

2. Data and Methods

2.1. Research Objects

Forty patients were hospitalized in our department for surgical treatment before the improvement of the special case (from January 1 to May 31, 2022) and had a postoperative Caprin score of >5 as the control group, and 40 patients were hospitalized in our department for surgical treatment after the improvement of the special case (from July 1 to November 30, 2022) and had a postoperative Caprin score of >5 as the experimental group. Inclusion criteria for the study population: postoperative Caprin score >5 ; clear consciousness and normal cognitive function. Exclusion criteria: cognitive impairment;

contraindications to the use of gradient compression stockings, including severe lower extremity arterial disease (e.g., ischemic disease of the lower extremity arteries, gangrene of the lower extremity); severe peripheral neuropathy or other sensory deficits; pulmonary edema (e.g., congestive heart failure); skin/soft tissue disease of the lower extremity (e.g., recent implantation or presence of dermatitis); deformities of the lower extremity that make it unfit to be worn; the presence of a large open or draining wound of the lower extremity Severe cellulitis of the lower extremity; thrombophlebitis of the lower extremity; known allergy to GCS materials [10]. Control group: 21 males and 19 females; aged 29-78 (54.48 ± 12.88) years. In the experimental group, there were 21 males and 19 females, aged 25-80 (54.15 ± 12.80) years. Comparison of gender and age between the two groups showed no statistically significant difference ($p > 0.05$).

2.2. Methodologies

2.2.1. Control Subjects

Forty patients who were hospitalized in our department from January 1 to May 31, 2022, for surgical treatment and had a postoperative Caprin score of >5 were counted using routine nursing measures and postoperative health education, and the number of cases of patients who used gradient compression stockings to prevent deep vein thrombosis during hospitalization was only 6, and the utilization rate was 15%. And a questionnaire was used to investigate the degree of patients' awareness of deep vein thrombosis and their satisfaction with the nursing care. The questionnaire was used to investigate patients' awareness of DVT and satisfaction with nursing care.

2.2.2. Test Group

Based on the control group, the department formally launched the project management activities in the first half of June. A case improvement team was set up with the head nurse as the leader, and the team consisted of one doctor, four senior nurses, and three junior nurses in the ward.

2.2.3. Cause Analysis

In mid-June, members of the task force analyzed the reasons for the low use of gradient compression stockings in high-risk patients with deep vein thrombosis in the department through brainstorming, drew a fishbone diagram (as shown in Figure 1), and identified three main reasons through the analysis of the key factors: lack of stockpiles of gradient compression stockings in the department; failure of the department to develop a standard process for the use of gradient compression stockings; and low awareness of deep vein thrombosis among the patients and their families. thrombosis and lack of relevant attention.

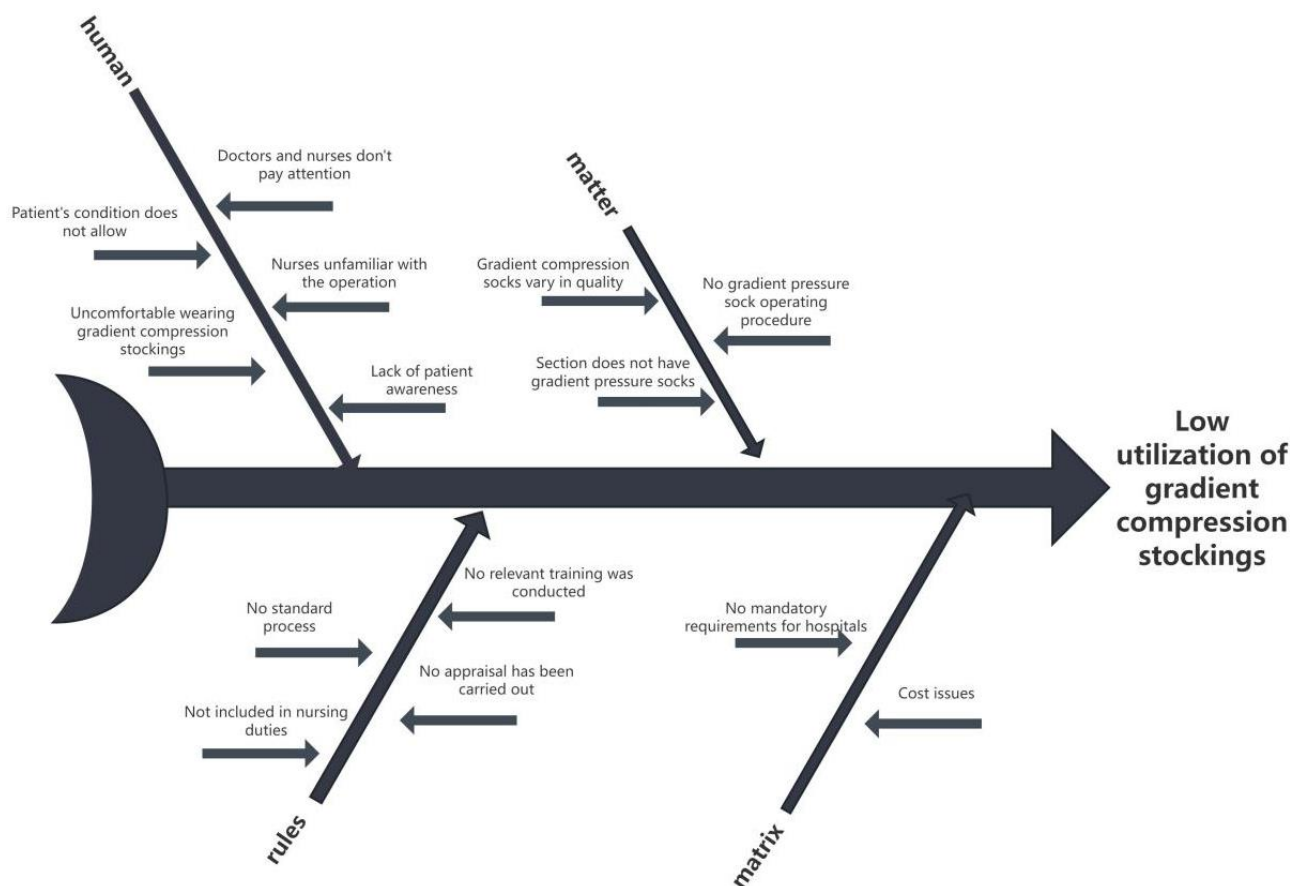


Figure 1. Fishbone Diagram for Project Improvement.

2.2.4. Develop and Implement Improvement Measures

- i. Medical and nursing assistance to jointly select the most therapeutically effective, economical, and comfortable gradient compression stockings, including preventive and therapeutic types. QR codes for the convenient purchase of gradient compression stockings were also created to facilitate self-scanning and purchase by patients.
- ii. Review of relevant literature guidelines [10]. In addition, an assessment form (Figure 2) and a standardized procedure (Figure 3) for the use of gradient compression stockings in the department were developed. At the same time, all nurses in the department were trained and assessed on the assessment of use of gradient compression stockings, the standardized procedure, and the prevention of complications.
- iii. The video of preventive wearing of gradient compression stockings was filmed, and the filmed video was made into a QR code and pasted under the TV set in each ward, which was convenient for patients and their families to scan the code and watch; relevant publicity posters were made and pasted in the corridors of the wards, and paper publicity pamphlets were perfected

and put in the wards for patients to flip through; meanwhile, bedside nurses strengthened the health education of patients' families, and emphasized the importance of preventing DVT and the effectiveness and safety of elastic stockings during hospital admission and before and after operation; in addition, a health education class was conducted once a week by the head nurse or senior nurse to increase the interest and acceptance of patients and their families; and finally, a WeChat follow-up group was set up to carry out follow-up and health interviews for discharged patients.

- iv. Implementation and evaluation of the effectiveness of the measures.

Improvement measures will be implemented from July 2022 until the end of December, when an evaluation of the effectiveness of the project will be conducted [11].

2.3. Evaluation Indicators

The evaluation metrics were the rate of gradient compression stocking use, patient knowledge of DVT, and satisfaction with care, and were compared with the period before the project management.

2.4. Data Analysis Methods

SPSS26.0 was used to statistically analyze the data, an in-

dependent samples t-test was used for the measurement data, a chi-square test was used for the count data, and $P < 0.05$ indicated that the difference was statistically significant.

Gradient Compression Stocking Utilization Assessment Form

Bed No.:	Name:	Age:	Hospitalization No:
Diagnosis:	Caprin score:		
Timing of evaluation:	admission <input type="checkbox"/>	Postoperative <input type="checkbox"/>	
Evaluation projects	be	clogged	note
Lower Extremity Skin/Soft Tissue Diseases (e.g., recent implants or presence of dermatitis)			
gangrene			
cellulitis of the lower limbs			
Severe lower extremity arterial disease (e.g., ischemic disease of the arteries of the lower extremities, vasculitis, atherosclerotic occlusion)			
thrombophlebitis			
septic phlebitis			
Bilateral lower extremity trauma, skin, muscle, bone grafts or major limb surgery			
diabetic foot			
Severe deformities of the lower limbs			
Acute phase of deep vein thrombosis not treated surgically			
Massive lower extremity edema and pulmonary edema due to congestive heart failure			
Known allergy to GCS materials			
Evaluating physician: Date of evaluation:			

Note: 1. The Basic Information column is to be completed by the nurse in charge; the Assessment column is to be completed by the physician in charge.

2. The presence of a "yes" to any of the items in this assessment means that the use of a gradient pressure band is not recommended for this patient.

3. Reasons need to be specified in the remarks column.

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Figure 2. Gradient Compression Stocking Utilization Assessment Form.

Gradient compression stockings use program flow

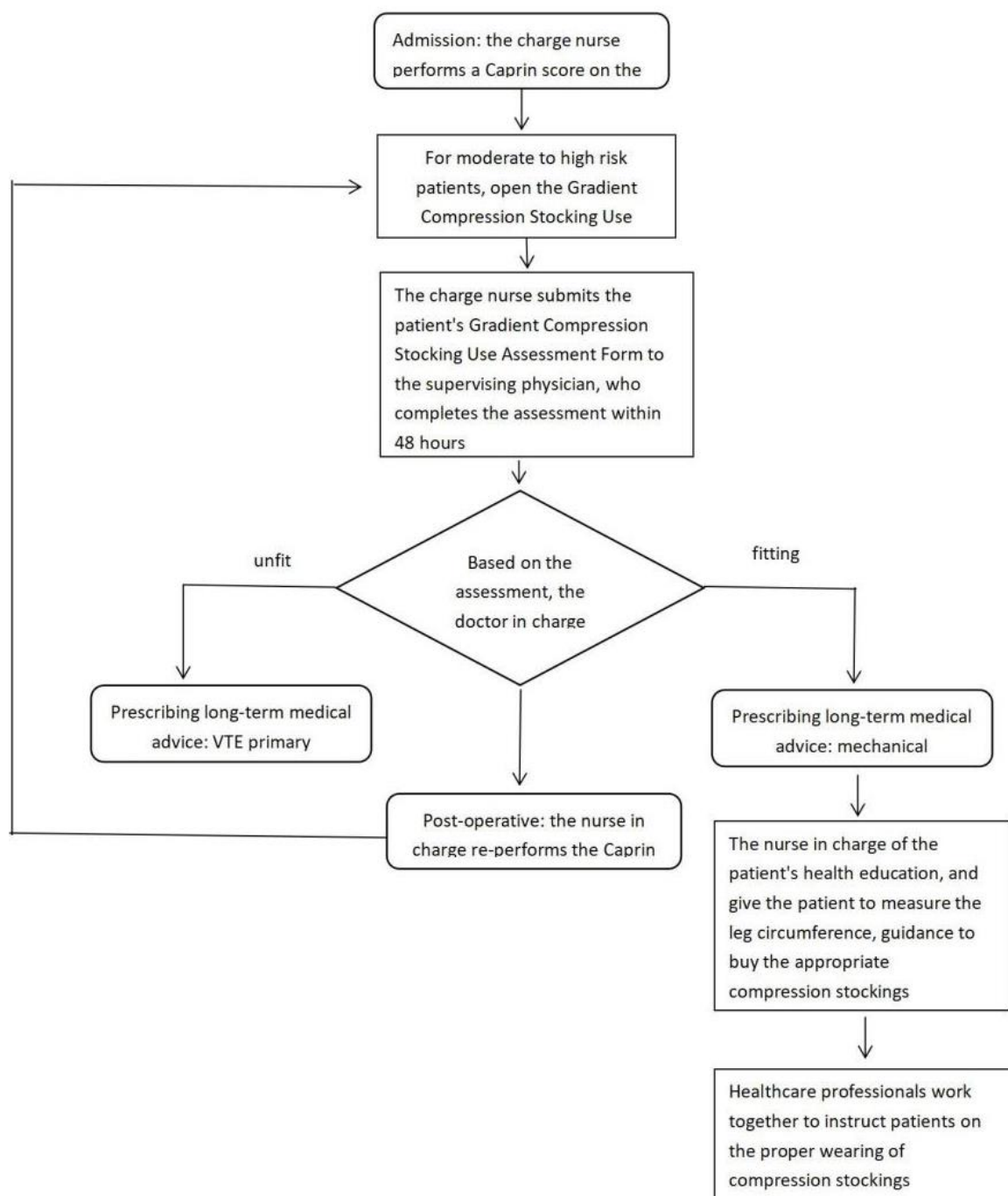


Figure 3. Gradient Compression Stocking Utilization Criteria Flowchart.

3. Results

3.1. Comparison of the Utilization Rate of GCS Between the Two Groups of Patients Before and after the Improvement of the Special Program

The use of gradient compression stockings in patients at high risk of DVT was only 15% before the project management, and the use of gradient compression stockings increased to 85% after the implementation of the project management activities, and the difference was statistically significant ($P < 0.05$), as shown in [Table 1](#).

Table 1. Comparison of the utilization rate of gradient compression stockings before and after the project management (cases).

	Before project managements (n=40)	After project managements (n=40)	X ² value	P
Gradient compression stocking utilization	6 (15%)	33 (82.5%)	36.473	0.000

3.2. Comparison of Patients' Knowledge of DVT Between the two Groups Before and After the Improvement of the Special Program

The patients' awareness of DVT was significantly higher after the improvement of the special case than before the improvement, and the difference was statistically significant ($P < 0.05$), as shown in Table 2.

Table 2. Comparison of patients' awareness of DVT before and after the improvement of the special program (cases).

	Before project managements (n=40)	After project managements (n=40)	X ² value	P
DVT concept	3	20	17.635	0.000
DVT Hazards	10	34	29.091	0.000
DVT preventive measures	2	29	38.394	0.000
Gradient compression stocking cognition	4	35	48.080	0.000
Correct wearing of gradient compression stockings	2	29	38.394	0.000

3.3. Patient Satisfaction with Nursing Care

The patients' satisfaction with nursing care increased from 91.73 points to 98.75 points after the improvement of the special case, and the difference between the two groups was statistically significant ($P < 0.05$), as shown in Table 3.

Table 3. Comparison of mean score of patients' satisfaction with nursing care before and after project management

	Before project managements (n=40)	After project managements (n=40)	X ² value	P
Average patient satisfaction score	91.73	98.75	45.36	0.000

4. Discussion

Graded compression stockings (GCS) are elastic compression stockings that can be worn from the ankle to the knee or from the ankle to the thigh depending on the length of the stocking, generating a gradual decrease in pressure during the wearing process to promote venous blood return in the lower extremities to improve the compression of lower extremity venous valves and prevent the occurrence of DVT [12]. The lower extremity valves can be compressed to prevent the occurrence of DVT. It is a safer and more effective prevention method for patients with a high risk of DVT and

relevant contraindications excluded. With proper guidance, patients can not only use it during hospitalization but also continue to wear it after discharge to prevent DVT and improve blood circulation in the lower limbs. However, relevant studies [13] show that to fully realize the efficacy of GCS, it is necessary to choose the appropriate compression stockings, so it is necessary to carry out strict leg circumference measurements of the patients and choose the most appropriate program for them. This shows the importance of nurses in this link. However, in practice, clinical nurses are far from sufficient to guide and educate patients on wearing gradient compression stockings for various reasons, and the utilization rate of gradient compression stockings is also low.

Through this project management activity, a standardized process plan can be formed to guide the nurses in this department to use gradient compression stockings on patients and improve the use of gradient compression stockings.

The nursing project management model is a new idea to improve the quality of nursing care effectively, through a scientific and reasonable attitude to deal with the existence of the problem, and systematic analysis to find the root cause, in a group mode to solve the problems together, to improve the quality of comprehensive nursing care [14]. The group model is used to solve problems together to improve the quality of comprehensive nursing care. Before the project management, for patients with a high risk of thrombosis and no contraindications, medical care only informed patients that they could wear gradient compression stockings to prevent thrombosis, lacking detailed guidelines. As a result, patients purchased gradient compression stockings of varying quality and size, which were not comfortable to wear and did not prevent thrombosis. In the project management, the team used brainstorming and fishbone diagrams to explore and analyze the root causes and formulate countermeasures with a tightly interconnected medical nursing-patient triple loop. The patient was assessed by the doctor and nurse together to determine the patient's suitability for the use of gradient compression stockings, and the nurse gave the patient a measurement of leg circumference, as well as detailed and comprehensive health education, and chose the most appropriate program for him. After a series of related improvement measures, patients' awareness, recognition, and acceptance of gradient compression stockings were greatly enhanced.

5. Summary

In conclusion, this project management activity can effectively improve the utilization rate of gradient compression stockings in high-risk patients with deep vein thrombosis, increase patients' attention to deep vein thrombosis and recognition of gradient compression stockings, and enhance patients' satisfaction with nursing care. However, due to the small sample size, the chance of the research results cannot be completely excluded, and it is necessary to continue to expand the study in the future and constantly demonstrate the scientificity and effectiveness of the research program [15]. The study was conducted in 60 hospitals. A study in 60 hospitals showed that [16] only 1.85% of the hospitals were equipped with compression stockings individually, and since gradient compression stockings are consumable and are used for long periods in the clinic, issues such as the medical costs of patients need to be further explored. At the same time, there is no consensus on the optimal intensity and duration of the application of gradient compression stockings. Current evidence shows that although higher intensity pressure socks can better relieve lower limb discomfort, they will also bring a lot of discomfort to patients [17]. Therefore, there is still a test and challenge to improve patients' compliance with gradient compression stockings,

which needs to be used by medical staff to continue to explore.

Abbreviations

DVT	Deep Venous Thrombosis
PE	Pulmonary Embolism
VTE	Venous Thromboembolism
IPC	Intermittent Pneumatic Compression Devices
GCS	Gradient Compression Stockings
VFP	Venous Plantar Pumps

Funding

This study was funded by Nurturing funds for nursing talents of Jinan University (JHA20230604) and the Nurse Association of Guangdong Province (gdshsxxh2023ms15).

Conflicts of Interest

The authors declare no conflicts of interest.

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