

## Nursing care in the prevention of venous thromboembolism: an integrative review

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### ABSTRACT

This study sought to identify in the scientific literature the nursing care provided for the prevention of venous thromboembolism (VTE) in hospitalized patients. It is an integrative review of the literature conducted in the Public/Publish Medline (PUBMED) and Virtual Health Library (VHL) databases. The studies included in this review were in English, Spanish, and Portuguese and published between 2006 and 2016. They addressed nursing care in the prevention of VTE in hospitalized patients. The studies were located by cross-referencing the terms "nursing care", "prevention" and "venous thromboembolism. The predominating topics were nursing care in the prevention of VTE, categorized under "implementing VTE risk assessment", "mechanical and physical interventions", and "educating patients on VTE". These findings may contribute to the systematization of nursing care by expanding and directing care possibilities, favoring nurses' autonomy, and supporting research to validate and reinforce vascular nursing as a speciality area.

**Descriptors:** Nursing Care; Venous Thromboembolism; Disease Prevention; Evidence-Based Nursing.

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## INTRODUCTION

When thrombi are formed in the venous system, they trigger venous thromboembolism (VTE), manifested by deep vein thrombosis (DVT) and pulmonary thromboembolism (PTE)<sup>(1-2)</sup>. These clinical situations can rapidly lead to death, disabilities or handicaps with significant health, economic, and social impacts<sup>(3)</sup>.

An estimated one in four deaths worldwide is caused by VTE, and it is considered the third cause of death after acute myocardial infarction and cerebrovascular accident<sup>(1-2)</sup>.

In hospitals, venous thromboembolism has a high morbidity and mortality rate and an estimated 60% of VTE cases occur during or after hospitalization, making it one of the leading causes of preventable hospital death<sup>(1)</sup>.

Virchow's triad, consisting of blood stasis, *hypercoagulability* and vascular damage, explains the pathogenesis of VTE<sup>(1)</sup>. The risk factors for VTE can be hereditary/idiopathic (thrombophilia, history of previous VTE) and acquired/caused (old age, comorbidities, immobilization, use of central venous catheters, infections, surgical treatment, chemotherapy, among other factors already described in the scientific literature), and individuals with several factors concomitantly have a greater risk of developing VTE<sup>(3-4)</sup>.

Considering the various risk factors for VTE among hospitalized patients, nurses, who provide continuous and uninterrupted care, are essential in identifying the risk of venous thromboembolism and in implementing prophylactic interventions<sup>(5-6)</sup>.

In this sense, it is necessary to reflect on the definition of intervention. For the classification of nursing interventions<sup>(7)</sup>, a nursing intervention is the treatment chosen by nurses, based on clinical knowledge and reasoning, to improve patient outcomes.

However, choosing the best care to prevent VTE and overcome the inefficient care practices still performed for hospitalized at-risk patients, nurses must base their decisions on scientific evidence<sup>(6)</sup>. A multicentric study demonstrated the underutilization of VTE prevention in hospital programs and found that only 60% of participants receive appropriate prophylactic measures<sup>(8)</sup>. These findings corroborate estimates that there are still 135 times more cases of VTE in hospitalized patients than in other populations outside of hospitals<sup>(1)</sup>.

Therefore, the aim of this study is to identify nursing actions for the prevention of venous thromboembolism in hospitalized patients.

## METHODOLOGY

This is an integrative literature review based on the methodology proposed in the literature<sup>(9)</sup> and recommendations of the PRISMA Statement<sup>(10)</sup>.

The PICO<sup>(11)</sup> strategy was used to define the following research question: "What is the evidence in the literature on nursing care for preventing VTE in admitted patients?"

The following libraries were used to search for papers: Virtual Health Library and Public/PublishMedline (PUBMED). The terms "nursing care" AND "prevention" AND "venous thromboembolism" were cross-referenced to locate the studies.

The inclusion criteria were experimental and descriptive studies in Portuguese, English and Spanish, published between 2006 and 2016. Letters, editorials, thesis, dissertations, reviews, book chapters, and other non-scientific texts were excluded.

Two different researchers initially reviewed the papers based on the title and abstract and the presence of inclusion criteria using a previously prepared relevance test. When the researchers were unable to choose whether to include or exclude a paper, the full text was carefully read and discussed. If they did not reach a consensus, a third researcher was asked to decide whether to include or exclude a study.

Data were extracted from the papers included using a form created by the authors containing the following items: ID, objectives, methodology (type of study, sample characteristics), nursing care-related items, outcome, conclusions and study limitations.

The levels of evidence of the studies were classified using the approach proposed by the Joanna Briggs Institute<sup>(12)</sup>.

After surveying nursing care for VTE prevention in the included papers, it was compared with nursing interventions and Embolus precautions, in the Nursing Intervention Classification (NIC)<sup>(7)</sup>, for the NANDA-I<sup>(13)</sup> taxonomy diagnoses “risk of ineffective peripheral tissue perfusion” and “ineffective peripheral tissue perfusion”.

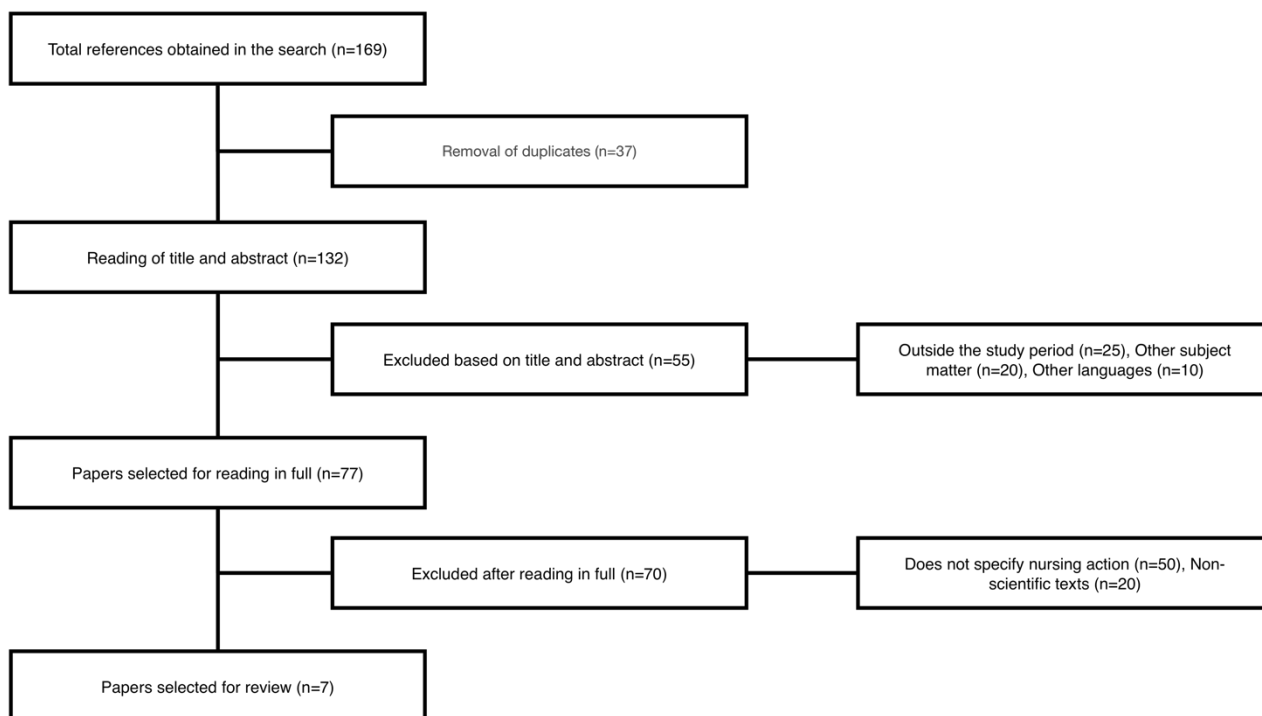
The NIC interventions<sup>(7)</sup> for the mentioned diagnoses and related activities were carefully read and the results of the studies selected for this review were associated using simple content analysis, without a specific methodological design, since this was not the aim of this study.

This comparison was important to organize the study results based on a nursing reference.

## RESULTS

At first, 169 studies were identified. Of these studies, 37 were duplicates and 55 did not meet the criteria for inclusion. After the relevance test was applied to the titles and abstracts, 77 papers were selected for critical reading, in full. Of these papers, 50 were excluded because they did not specify VTE prevention as a nursing action and 19 were excluded because they were not scientific texts, totaling seven articles (Figure 1).

Figure 1: Articles selection flowchart.



The studies were conducted in the United States (n=2), Iran (n=1), China (n=1), Turkey (n=1), Canada (n=1), Brazil (n=1), and the main language was English (n=7). All the studies (100%) were authored by nurses, and medical professionals participated in four (57%) studies. In relation to the sample profile, four articles referred to inpatients in surgical treatment (57%) and three articles referred to clinical and surgical inpatients (43%).

**Table 1:** Search result of articles about nursing care in the prevention of venous thromboembolism, published between 2006 and 2016, in virtual libraries PubMed, VHL.

Reference	Journal	Study design/Level of evidence
E1 – Ayhan et al., 2015	Journal of Clinical Nursing	Randomized clinical trial/Level of evidence: 1
E2 – Hou et al., 2013	Cancer Nursing	Randomized clinical trial/Level of evidence: 1
E3 – Ayatollahzade-Isfahani et al., 2013	Journal Vascular Nursing	Randomized clinical trial/Level of evidence: 1
E4 – Le Sage, Mc Gee and Emed, 2008	Journal Vascular Nursing	Quantitative cross-sectional study/Level of evidence: 3
E5 – Castilho et al., 2010	Arquivos Brasileiros Ciências da Saúde	Observational cross-sectional study/Level of evidence: 3
E6 – Palamone et al., 2011	Journal of Neuroscience Nursing	Quasi-experimental study/Level of evidence: 2
E7 – Race and Collier, 2007	Critical Care Nursing Quarterly	Case series/Level of evidence: 2

As to the objectives, the studies investigated the evaluation and stratification of VTE risk (28.5%), compression therapy (14.3%), electrical stimulation (14.3%), placement of LL (14.3%), range of motion exercises (14.3%) and knowledge of individuals about VTE and thrombosis prophylaxis (14.3%) (Table 2).

As regards nursing actions, in one of the studies, the authors mention the use of a tool to assess VTE risk as a nursing intervention, stressing the use of a DVT risk scale<sup>(14)</sup>. In another study, the authors cite the stratification of risk for VTE proposed by the Brazilian Society of Angiology and Vascular Surgery to support the choice of prophylactic measures<sup>(15)</sup>.

In the experimental studies<sup>(16-18)</sup> and the quasi-experimental study<sup>(19)</sup>, there was a predominance of nursing interventions for the physical and mechanical prevention of VTE: therapy with compressive elastic stockings, elevation of LL (lower limbs), range of motion exercises for the LL, and electrostimulation. Finally, one of the studies stressed patient education for VTE as a measure nurses should implement<sup>(20)</sup>.

The interventions in the studies are important contributions for VTE prevention, especially the positive effects of electrostimulation, use of compressive elastic stockings, elevation of LL, range of motion exercises, and educational VTE activities. Weaknesses related to the use of DVT risk assessment tools were also observed.

The Nursing Interventions Classification (NIC)<sup>(7)</sup>, often used to guide nursing instructions, was employed to illustrate the association between the recommendations described in the literature and those provided by nursing.

Thus, it was observed that "embolus precautions" is not included as a priority for the diagnoses "risk for ineffective peripheral tissue perfusion" and "ineffective peripheral tissue perfusion"<sup>(13)</sup>, which mostly correspond to the clinical situation of VTE.

There was a limited association between the results identified in the studies and the activities described for VTE interventions in hospitalized patients (Table 3).

**Table 2:** Summary of the included studies according to objective, method, and main results and conclusions.

	Objective	Method	Main results and conclusions
E1	Compare three types of elastic stockings of different compression levels regarding effectiveness in preventing DVT and the comfort they offer to patients in postoperative pelvic and abdominal surgeries.	The sample was divided into three experimental groups:	DVT was not identified in any of the patients in the three intervention groups. In groups III (79.5%) and II (52.1%), the patients had more discomfort and were less willing to continue use of compression stockings. In group I, the patients reported the compression stockings were comfortable. It is concluded that low elastic compression stockings are as effective as other types of elastic stockings with other compression levels and heights.
		Group I (n=73) = Used low compression elastic stockings (15-18 mmHg) knee length.	
		Group II (n=73) = Used low compression elastic stockings (15-18 mmHg) thigh height.	
		Group III (n=73) = Used moderate compression elastic stockings (20-30 mmHg) knee length.	
E2	Test the efficiency of electric stimulation in acupuncture points for the postoperative prevention of deep venous thrombosis in elderly patients with malignant gastrointestinal tumor.	The participants were divided into three groups:	It was found that participants who received electrical stimulation (group T) showed greater blood flow velocity in comparison to groups C1 and C2. As to blood viscosity, group T also presented lower values compared to groups C1 and C2. Therefore, electrical stimulation is a promising treatment in the prevention of deep venous thrombosis in elderly patients with a diagnosed malignant gastrointestinal tumor.
		C1 Group: received information on elevation of LL, physical exercises in the lower leg for seven days, three reps a day.	
		C2 Group: Group C1 treatment associated with the use of elastic compression stockings postoperatively.	
		Group T: Group C1 treatment plus electrostimulation treatment postoperatively.	
E3	Compare the impact of the dorsal decubitus with lower limb elevation has in relation to dorsal decubitus without elevation in preventing DVT, in patients undergoing cardiac revascularization surgery.	Group 1 (n=92): Patients were maintained in the supine position without LL lift	DVT was detected in 25 (13.5%) patients: 17 (18.4%) dorsal decubitus without lifting and eight (8.6%) in the group that received the leg elevation (p = 0.065). It was not possible to statistically prove an association between the type of position and DVT in the patients of this study due to the large number of potential confusion factors. However, this method can safely reduce venous stasis without causing side effects.
		Group 2 (n=93): Patients were maintained in dorsal decubitus position to the elevation of LL (30°), preoperatively, intraoperatively, and postoperatively to complete ambulation.	
		The two groups received anticoagulant and antiplatelet therapy and postoperative motor physical therapy.	
E4	Investigate the knowledge of patients on venous thromboembolism and thrombosis prophylaxis.	Patients were assessed using a questionnaire with 16 objective questions and five subjective questions on their knowledge of prophylaxis of venous thromboembolism, deep vein thrombosis, and pulmonary embolism; how they received information about VTE; how they would like to be informed about VTE at the hospital.	It was found that 80% of the sample was aware it received thrombosis prophylaxis medication, 81.2% of patients responded that they knew about DVT and VTE. When questioned about symptoms, they lacked knowledge of prophylactic measures and complications. The relationship between DVT and VTE was virtually unknown. A third of respondents reported they would like to receive more information from the nurses.
E5	Check the risk factors of DVT by reviewing the medical records of patients in intensive care and assess the prophylactic measures adopted with at-risk patients through nurse's and doctor's instructions.	The medical records were read at once. As presented at the time of collection. VTE risk factors were identified and analyzed according to the VTE risk classification algorithm recommended by the SBACV <i>Sociedade Brasileira de Angiologia e Cirurgia Vascular</i> (2005). Medical and nursing conduct to prevent VTE was also investigated.	Of the surgical patients, 76% were stratified as high risk and all clinical ICU patients were considered high risk. As for the drug treatment, 78% of the clinical patients and 64.8% of the surgical patients received unfractionated heparin (UFH). Only one patient used pneumatic boots to prevent VTE. In the nursing prescription, only the item "evaluate peripheral perfusion" was found. Patients were only moved in their beds in position change periods.

	<b>Objective</b>	<b>Method</b>	<b>Main results and conclusions</b>
<b>E6</b>	Verify the effectiveness of range-in-motion exercises of the feet and ankles in the prevention of deep vein thrombosis in patients admitted to a neurological intensive care unit.	Patients admitted to the neurosurgical ICU received prophylactic measures (thrombosis prophylaxis therapy, compression stocking during the period of immobility, early ambulation, etc.) and they were taught and encouraged to perform dorsiflexion exercises and plantar flexion, followed by medial and lateral foot rotation, 10 times every hour.	There was no difference in the DVT rates of patients who did range of motion exercises during the study and patients who only received the standard treatment. In the patients who agreed to join the exercise program and performed the range of motion in the foot/ankle, the occurrence of DVT was lower (38.7%) than in the patients who did not do the exercises properly (58.4%).
<b>E7</b>	Review the clinical cases of inpatients at risk for DVT, discuss the risk stratification, and adopted prophylactic measures.	The cases were analyzed by surveying positive factors for DVT, according to the Caprini risk assessment, and clinical management of the patients for VTE prevention was verified.	In case 1, the absence of a risk assessment tool made it impossible to detect the positive factors for DVT. The patient did not receive thrombosis prophylaxis during hospitalization and was discharged and quickly readmitted with VTE, evolving to death. In case 2, the patient was high risk for DVT, received mechanical thrombosis prophylaxis by means of an intermittent compression device, and did not develop DVT. The Caprini risk assessment scale is used to track at-risk patients and select the most appropriate prophylactic measure to prevent thromboembolic complications.

**Table 3:** Comparison between the care identified in the reviewed studies with the intervention "embolus precautions" of the Nursing Interventions Classification (NIC)<sup>(7)</sup>.

Nursing care for VTE prevention, according to studies included in the review:	Corresponding care for the intervention "Embolus precautions" (NIC) <sup>(7)</sup> :
Evaluate and stratify VTE risk in hospitalized patients <sup>(14-15)</sup>	Obtain detailed patient health records to determine risk factors.
	Assess the presence of Virchow's triad: venous stasis, hypercoagulability, trauma resulting from intimal damage
Indicate and implement the use of compression stockings, based on a prior assessment for VTE risk <sup>(16)</sup>	Apply gradual compression stocking or elastic compression sleeves to reduce the risk of DVT or prevent recurrence, according to the organizational policy and protocol
Assess, on a daily basis, skin color, peripheral perfusion of limbs receiving compressive treatment <sup>(16)</sup>	Remove elastic compression stocking and intermittent pneumatic compression device for 15 to 20 minutes every 8 hours or according to organizational policy and protocol
Assess the level of comfort and ensure the proper compression <sup>(16)</sup>	8 hours or according to organizational policy and protocol
Apply electrical stimulation on acupuncture points <sup>(17)</sup>	There is no corresponding care
Place the patient in supine position with LL elevation at 30° during the intraoperative and postoperative periods <sup>(18)</sup>	Lift any limb that may be affected at least 20° above heart level to increase venous return
Teach and supervise patients to perform dorsiflexion and plantar flexion exercises, followed by medial and lateral rotation of the foot, 10 repetitions every hour until full ambulation of the postoperative patient <sup>(19)</sup>	Encourage patients to flex and stretch the feet and legs at least 10 times every hour
Teach inpatients about VTE, preventive measures and complications of the disease <sup>(20)</sup>	Inform patients and their families about the necessary precautions
Educate patients in thrombosis prophylaxis therapy <sup>(20)</sup>	Educate patients and their families of all prophylactic low-dose anticoagulant and/or antiplatelet medication
	Educate patients to report excessive bleeding, abnormal wounds, unusual pain or swelling, cyanosis and foot/toe pain, ulcers or white patches in the oral cavity
	Educate patients to use anticoagulant medication at the same time every day and not to double dose the next day if they forget to take their medication
	Advise patients to see a healthcare professional before using any medication or plant-based preparation, prior to choosing medication brands and before interrupting their use

## DISCUSSION

Given the low number of publications on nursing care for the prevention of venous thromboembolism (VTE) and the increased focus on care for the treatment of vascular etiology wounds from thromboembolic disorders, it is important that the practice also address the prevention of complications, such as the prevalent vascular ulcers, which require similar care to prevent recurrence<sup>(21)</sup>.

Despite the significant morbidity of vascular ulcers, they are not the only complication of VTE; in hospitals, pulmonary embolism and other peripheral ischemic events are extremely worrisome due to the risk of death<sup>(1-4)</sup>.

Although initiatives to prevent VTE and reduce death and the disabilities caused by the disease do exist, especially in North America, Europe and Asia<sup>(2)</sup>, the number of nursing associations and journals on vascular diseases is low, revealing the need to strengthen specific nursing education in this area and consequently provide an assertive and guided approach to VTE prevention.

Another point raised is the absence of studies with exclusively clinical patients. Around 50%-70% of fatal VTE and DVT cases occur in hospitalized patients with clinical diseases<sup>(14)</sup>.

As in other studies that sought to associate the recommendation of specialized literature and interventions of the Nursing Interventions Classification (NIC)<sup>(21)</sup>, and despite the relevance of care provided in the NIC<sup>(7)</sup>, this taxonomy is limited in relation to specific care, as in the cases of patients at risk for VTE, thus revealing the need to permanently search specialized literature and ensure greater comprehensiveness of interventions.

Moreover, in the diagnosis "risk of ineffective peripheral tissue perfusion", defined as "vulnerable to a decrease in blood circulation to the periphery, which may compromise health", there was no risk factor that attributed this situation to being hospitalized. This finding reinforces the suggestion that nursing practices for hospitalized patients at risk for VTE are not well established in the investigated taxonomies and reflects clinical practices in terms of systematizing nursing care at institutional level.

According to the NIC<sup>(7)</sup> and the judgement of experts in the area, the intervention "embolus precautions" should at least be performed by a professional nurse for a minimum of 16 to 30 minutes for all the described activities.

When including the care identified in the studies of this review, the time and minimum qualification may be extrapolated given the specific nature of this care, which includes electrostimulation<sup>(17)</sup> and teaching/supervision of a lower limb exercise program<sup>(19)</sup>.

In contrast, the information provided in the NIC is important to improve the systematization of care in this nursing practice area.

Nevertheless, the limited number of experimental research identified in this study makes it difficult to verify the effectiveness of interventions. Furthermore, the studied populations were highly heterogeneous and data on the sample characteristics, such as VTE risk factor information, was scarce. The prophylactic measures used in the study groups were not fully described, thus preventing a detailed review of these interventions.

To optimize the analysis of data from the interventions identified in the studies of this review, the data were presented in the categories used to define nursing actions for VTE prevention.

### **Category 1: Implementing VTE risk assessment: implications for nurses**

The risk level assessments mentioned in the Brazilian and North American studies<sup>(14-15)</sup> guide the development and implementation of individualized interventions that prevent the onset of VTE, and reduce length of stay, number of readmissions, and hospital expenses due to complications arising from thromboembolic events<sup>(5, 14-15)</sup>.

However, the VTE risk assessment routine is not sufficiently performed by nurses<sup>(14-15)</sup>. Some of the obstacles of this practice are the lack of knowledge of nurses and the absence of institutional protocols and tools that support VTE risk assessment.

The VTE risk assessment should be performed on admission and during the hospital stay, preferably every 72 hours, considering the various stages and changes that occur during the process of admission and increase or decrease the factors for VTE<sup>(6,14)</sup>.

In this process, nurses can use instruments, such as the Caprini risk score, which assesses VTE risk factors and classifies patients as being at a very low, low, moderate, high or very high risk of developing DVT. Depending on the results, the health team must perform the recommended prophylactic measure<sup>(15, 22-23)</sup>.



In Brazil, medical institutions publish VTE prevention guidelines containing the algorithm for assessing the need for prophylaxis in clinical and surgical patients and the recommended prophylactic measures for each risk classification. However, the multidisciplinary teams are not using these guidelines sufficiently or observing the VTE prevention conduct as recommended<sup>(15,24)</sup>.

The underutilization of guidelines is also described in a study<sup>(25)</sup> with 236 patients, of which 80% had a high risk of VTE and only 34.9% receiving appropriate prophylactic therapy. With the implementation of the VTE prevention protocol, 43.2% of these patients started to receive prophylaxis. In another study<sup>(26-27)</sup>, with the implementation of the Caprini tool to guide prophylactic measures, the incidence of DVT in surgical patients dropped 84% and the incidence of VTE dropped 55%.

## **Category 2: Mechanical and physical interventions for VTE prevention**

The application of graduated compressive elastic stockings prevented VTE in all the surgical patients when associated with other preventive modalities<sup>(16)</sup>. A similar result was found in a study where only 4% of patients developed DVT when using compression stockings associated with other prophylactic methods, such as anticoagulants, change of decubitus and range of motion exercises, while 16% of patients acquired DVT with the isolated use of this device<sup>(16,28)</sup>.

Elastic stockings activate the calf muscles, decrease the diameter of the central veins, and, consequently, increase the speed and volume of blood flow that returns to the heart<sup>(28-30)</sup>. They are indicated for the prophylactic VTE treatment in hospitalized patients classified as low risk of developing VTE and in patients classified as moderate risk in cases where anticoagulant therapy is contraindicated due to the risk of a hemorrhagic event<sup>(24)</sup>. In patients with high risk of VTE, they are associated with the use of pharmacologic measures<sup>(23)</sup>.

The nurses implement, guide, and accompany patients in treatment with compression stockings<sup>(5-6,16)</sup>. When choosing the device, the pressure graduation must be high around the ankle, calves and lower thigh region, usually at least 20 mmHg compression to prevent VTE<sup>(16)</sup>. Waist-high stockings usually cause greater discomfort and are difficult to use in daily care, while knee length and thigh high stocking are better tolerated and effective in preventing DVT<sup>(16,31)</sup>.

Although nurses may recommend the use of elastic stockings, they must also be trained to indicate and accompany patients in therapy given the risks involved.

The nurses should perform daily assessments of patients using the compression method, especially around the bony regions. In patients with decreased sensitivity in the limbs, nurses should check for paleness of the skin, loss of integrity, marks due to excess compression, and reports of pain or discomfort<sup>(16,31)</sup>.

In relation to easily applied and low-cost physical interventions, patients can perform active and passive exercises for the lower limbs, especially those involving the calf muscles, to reduce venous reflux and thrombus formation<sup>(19,31)</sup>.

Similarly, the positioning of the patient in supine position with legs lifted at a 30° angle or at levels above the heart can reduce edema, venous stasis, and, consequently, decrease the incidence of DVT. The LL should be lifted until full ambulation is restored<sup>(18,31)</sup>.

In one of the studies, the authors mention the benefits of using complementary therapy associated with conventional treatment. The study describes the application of electrical stimulation on acupoints in the LL, which reduced blood viscosity and increased blood flow velocity in the area that received the low-voltage electrical stimulation<sup>(17)</sup>.

The use of transcutaneous electrostimulation triggers electrical impulses that can often generate involuntary movement of muscle groups, and these contractions in the lower limbs improve venous return. Electrical stimulation is often used in patients who do not tolerate the use of compression therapy and in patients in which the use of anticoagulants is contraindicated due to the risk of hemorrhage<sup>(17,32)</sup>.

Despite evidence of the benefits of physical and mechanical measures, some obstacles seem to prevent the implementation of this care by nurses. These obstacles to VTE prevention include the absence of standardized protocols directed to users, lack of training on how to use these tools, the absence of available compression devices, and time shortages<sup>(7)</sup>.

### **Category 3: Educating patients on VTE**

A study conducted in Canada<sup>(20)</sup> found that hospitalized patients are mainly unaware of information regarding signs and symptoms of VTE, the severity of thromboembolic complications, and ways of prevention. The limited knowledge they have of DVT and VTE results in low adherence to prophylactic measures<sup>(20,31)</sup>.

Health education is one of the tasks of nurses; however, the technical and administrative requirements of nurses can limit this work. Education occurs in a vertical manner and is restricted to specific guidelines, especially during admission and discharge, with observed weaknesses in the validation of teaching-learning with patients<sup>(20,33)</sup>.

Nurses who manage to actively educate patients at risk for VTE seem to obtain satisfactory results, as observed when they used explanatory materials<sup>(20)</sup> and videos<sup>(34)</sup> to educate patients about the risk of VTE. When the video about VTE was used, the inpatients answered 83% of the questions about risk factors, symptoms and prophylactic measures correctly, while only 62% of the questions were correctly answered by inpatients who did not watch the video<sup>(34)</sup>.

Explanations of the disease and preventive care, such as the benefits of early ambulation and compression therapy, may encourage patients to initiate early interventions<sup>(14)</sup>. Similar results were found in hypertensive patients, who were more likely to adhere to treatment after receiving information on the disease and treatment<sup>(35)</sup>.

The role of nurses exceeds to watch and manage, and patient education is inherent to their routine work. They are responsible for patients, family members and even the nursing staff and health officials<sup>(33)</sup>. Moreover, nurses must continuously train and supervise the nursing staff to perform preventive care for VTE.

Therefore, education is an element of care that enhances and supports interventions in a constructive-reflexive, singular-plural, and dynamic-flexible manner. Education contributes to the quality of care to inpatients, values the nursing and increases the autonomy of nurses<sup>(33)</sup>.

## FINAL CONSIDERATIONS

The preventive measures identified in this study, in which nursing can intervene, include range of motion exercises, compression therapy, early mobilization, positioning of the LL, electrostimulation, and individual education regarding the risk of VTE, its impact, and strategies for prevention.

Although the results point to different nursing interventions for preventing VTE in hospitalized patients, the documentation of nurses' experiences in preventing VTE is still scarce, especially in Brazil. These findings reveal the importance of considering the organization and recognition, at national level, of vascular nursing as a speciality area, different from the area of dermatology and/or wound therapy, as in other countries.

This would allow more driven and systematized investments for this area, thus strengthening the autonomy of nurses and, consequently, improving the care provided to these patients.

The implementation of care for the prevention of VTE identified in this study supports the nursing process for hospitalized patients at risk of ineffective peripheral tissue perfusion, the systematization of care, and the production of knowledge in this area.

Future research in nursing should validate this care in different populations with varying profiles, in the hospital setting and outside hospitals, since home care patients and inpatients in long-stay institutions, among others, are exposed to a similar risk of developing VTE.

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