



THROMBOPROPHYLAXIS KNOWLEDGE AND PRACTICES OF INTENSIVE CARE NURSES: PRACTICE AND EXPERIENCES AFTER COVID-19

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Abstract: This study was conducted to determine the knowledge and practices of nurses working in the intensive care unit regarding thromboprophylaxis practices during the Covid-19 pandemic. The research was conducted with 117 nurse intensive care nurses who agreed to participate in the research. In the study, data were collected by using the "Nurse Information Form" and "Evaluation Form of Knowledge and Practice Experiences on Venous Thromboembolism" via Google questionnaire. Ethics committee approval and approval were obtained from the participants before the study. As a result of the study, it was determined that the majority of the nurses (62.4%) did not receive in-service training on thromboprophylaxis, but 70.1% stated that their knowledge about venous thromboembolism (VTE) risk assessment was good. Moreover, it was determined that 61.5% of the nurses experienced VTE in patients with a diagnosis of Covid-19 in their clinics, 30.6% of them had DVT, 68.1% had a pulmonary embolism, 62.52% had a cardiac embolism and 31.9% had neurological events. As a result of this study, it can be suggested that intensive care nurses should improve their knowledge level with in-service training on VTE, and that patient care should be handled more carefully in terms of VTE in pandemics with physiological effects like Covid-19.


Keywords: Intensive care unit, Thrombophylaxis, Covid-19, Nurse


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1. Introduction

Venous thromboembolism (VTE) is the name given to the formation of blood clots (thrombosis) within the veins. This clot emerges as two important problems: deep vein thrombosis (DVT) and pulmonary thromboembolism (PTE). These clinical conditions can cause rapid death, disability, significant health problems, and economic and social losses. In addition, 60% of VTE cases occur during or after hospitalization and are one of the leading causes of preventable hospital deaths (Barp et al., 2018; Ma et al., 2017). The results of the ENDORSE (Epidemiologic International Day for the Evaluation of Patients at Risk for Venous Thromboembolism in the Acute Hospital Care Setting) study in Türkiye, which was worldwide research on the risk of venous thromboembolism and VTE protective methods; it was reported that the risk of VTE in surgical patients was 65%, but only 39% of these patients receive prophylactic treatment, while the risk of VTE in medical patients was 24% and the rate of prophylactic treatment was 39% (Cohen et al., 2008).

VTE is a common but often silent complication of critical

illness that has a negative impact on patient outcomes. The importance of VTE increases even more in patients with multi-organ failure, especially in intensive care units (Ejaz et al., 2018). Patients in intensive care usually have more than one risk factor for VTE, especially sedation, mechanical ventilator, immobility, and underlying diseases that increase the risk of VTE. In addition to these, it is more difficult to detect the symptoms due to the unconsciousness of the patient and the limitation of diagnostic radiological procedures also prevents the diagnosis of VTE (Cook et al., 2005).

Covid-19 is a disease that usually causes acute respiratory distress and causes patients to be followed frequently in intensive care units. The number of studies showing an increased risk of thrombosis, especially during Covid-19, is increasing. Although it is known that Covid-19 often causes hypercoagulability in patients, the cause has not yet been fully elucidated. Many factors such as direct invasion of endothelial cells by the virus, the release of cytokines, endothelial damage caused by intravascular catheters, which are frequently used in the follow-up processes of patients, as well as hyperviscosity,



and an increase in vascular stasis due to immobilization of patients in intensive care units cause VTE (Akpınar, 2020). Venous thromboembolism was found in 25-43% of Covid-19 patients hospitalized in the intensive care unit (Cui et al., 2020; Helms et al., 2020; Middeldorp et al., 2020). In other studies, routine surveillance was performed with the bilateral leg Doppler Ultrasonography (USG) method, and the rate of VTE was determined to be between 65-69% in patients followed in the intensive care unit with the diagnosis of Covid-19 (Llitjos et al., 2020; Nahum et al., 2020).

VTE prophylaxis is performed in two ways: mechanical and pharmacological. Mechanical prophylaxis is applied with various means of antiembolism stockings and pneumatic compression devices to prevent venous stasis. Pharmacological prophylaxis, on the other hand, seeks to inhibit blood coagulation by direct inhibition of the coagulation process or platelet aggregation factors. Pharmacological thromboprophylaxis reduces the incidence of VTE by approximately 50% (Arabi et al., 2019). In an observational study conducted with intensive care patients receiving low molecular weight heparin (LMWH), which is frequently used in pharmacological prophylaxis, the frequency of VTE was found to be between 5.1% and 15.5%, and bleeding complications due to pharmacological prophylaxis was 7.2% to 23.1% (Ribic et al., 2009).

Nurses often encounter patients at high risk of thromboembolism in intensive care clinics. For this reason, it is of great importance that nurses working in these fields have sufficient knowledge about venous thromboembolism risk factors, and interventions to prevent thromboembolism (patient mobilization, leg exercises, fluid intake, etc.), thromboembolism practices and complications, and that they can apply them. In the study conducted by Karadoğan et al. (2020) found that the level of knowledge of nurses about venous thromboembolism was above the middle. Likewise, in the study of Oh et al. (2017) determined that the majority of nurses had a moderate level of knowledge about venous thromboembolism. In the study conducted by Lee et al. (2014) determined that the knowledge level of most nurses regarding the diagnosis of venous thromboembolism risk was "good and moderate". Furthermore, it has been determined that nurses with higher knowledge about venous thromboembolism practiced more actively in the diagnosis and preventive care interventions for venous thromboembolism, they could use mechanical thromboembolism devices effectively, mobilized patients early, encouraged patients to do leg exercises and they trained their patients on oral anticoagulants.

In the study by Silva et al. (2020) found that nurses perceived their VTE risk assessment knowledge to be good, but 33.1% of them made a risk assessment. In another study, 89.1% of the nurses reported that they questioned risk factors in their clinics, and 79% did not use any scale (Yakar et al., 2019). In a study by Ma et al.

(2018) It was determined that intensive care nurses were more conscious of thromboprophylaxis than nurses in the service.

Considering all these studies, especially the intensive care nurses' knowledge of VTE prophylaxis and their practices, it is thought that it will be able to draw attention to this issue and guide in health situations with mass effects that may be seen in the future.

1.1. Aim and Research Questions

This study was conducted to determine the knowledge and practices of nurses working in the intensive care unit on thromboprophylaxis practices and their experiences in the Covid-19 outbreak.

1. What is the knowledge status of intensive care nurses about VTE?
2. Does the knowledge of intensive care nurses about VTE affect their practice?
3. What are the 'VTE' experiences of intensive care nurses during the Covid 19 period?

2. Material and Methods

2.1. Design

The research is a cross-sectional and descriptive study.

2.2. Sample

The population of the research consisted of nurses working in the intensive care units of two hospitals affiliated to the Ministry of Health in two cities in the Central Anatolia region. The research data were completed with 117 nurses (more than 70% of the population was reached in the sample) who agreed to participate in the study between September 15 and December 15, 2021.

2.3. Data Collection Tools

In the study, data were collected by using the "Information Form" and "Venous Thromboembolism Assessment Form".

2.3.1. Information form

Consists of four questions including nurses' age, gender, and educational status and working hours in intensive care units.

2.3.2. Evaluation form of knowledge and practice experiences on venous thromboembolism

It was collected with questions prepared by the researcher, using the form "Assessment of the level of knowledge about venous thromboembolism" developed by Karadoğan et al. (2020). The form consists of 7 questions that measure nurses' knowledge levels of "evaluating risk levels for venous thromboembolism", "pharmacological and non-pharmacological practices to prevent venous thromboembolism" and "nursing practices that should be done for thromboprophylaxis for patients", and 6 questions about their experiences during the Covid-19 period.

2.4. Data Collection

During the data collection process, an online questionnaire (Google Form) was shared with the hospital nurse groups of the nurses and the nurses were asked to fill in the questionnaires. In the questionnaire,

the purpose of the researcher was presented with the option that the data would be based on confidentiality and that participation in the research was voluntary, and the nurses who agreed to participate in the study were included in the study.

2.5. Statistical Analysis

The data obtained from the research were evaluated with the SPSS 22.0 (Statistical Package for Social Science) package program. The conformity of the data to the normal distribution was evaluated using the Kolmogorov-Smirnov test and kurtosis-skewness, and frequency, percentile, arithmetic mean, standard deviation and median were used in the evaluation of descriptive data.

3. Results

The findings regarding the Covid-19 pandemic thromboprophylaxis knowledge and practices of intensive care nurses are given below.

The distribution of nurses by descriptive characteristics is given in Table 1. When the table was examined according to the descriptive characteristics, it was determined that 36.8% of the nurses participating in the study were between the ages of 31-40, 77.8% were women and 80.4% had Bachelor's degree. Furthermore, 62.4% of the nurses worked in the training and research hospital, 89.7% of them were in the 3rd level intensive care units and 61.6% has worked for 1-5 years. Moreover, it was determined that the majority of the nurses (62.4%) did not receive in-service training on thromboprophylaxis, however, 70.1% of them stated that their knowledge about VTE risk assessment was good (Table 1).

Table 2 shows nurses' knowledge and practices regarding thromboprophylaxis. When Table 2 was examined, it was determined that 92.3% of the nurses did not know the risk assessment protocol/scales related to VTE, 70.0% of them made a VTE risk assessment, and 39.2% of them made a VTE risk assessment once at every shift change. It was determined that pharmacological methods were used most frequently for thromboprophylaxis in the clinics where nurses work, and Heparin infusion (36.8%), Clexane (95.7%) and Coumadin (47.0%) were used most frequently. Besides, it was determined that nurses most frequently used antiembolic stockings (99.1%), intermittent pneumatic compression (8.5%) and graduated compression stockings (5.1%) among mechanical methods. When we look at the practices of the nurses regarding thromboprophylaxis, it was determined that 84.6% of them followed the patients for the side effects of anticoagulants, 41.0% of them gave education to the patients and their families about anticoagulants, and 35.0% of them gave education to the patients and their families about VTE prevention and treatment (Table 2).

Table 1. Distribution of nurses by descriptive characteristics introductory features

Introductory	n	%
Age		
18-25	20	17.1
26-30	33	28.2
31-40	43	36.8
41-50	21	17.9
Gender		
Female	91	77.8
Male	26	22.2
Educational status		
High school	2	1.7
Associate degree	13	11.1
Bachelor's degree	94	80.4
Postgraduate degree	8	6.8
Employed institution		
Public Hospital	25	21.4
Training and Research Hospital	73	62.4
University Hospital	10	8.5
City hospital	9	7.7
Intensive care unit		
Level 1	3	2.6
Level 2	9	7.7
Level 3	105	89.7
Working time		
1-5 years	72	61.6
6-10 years	31	26.5
11-15 years	12	10.2
16-25 years	2	1.7
Status of receiving in-service training on thromboprophylaxis		
Received	44	37.6
Not received	73	62.4
State of knowledge about VTE risk assessment		
Poor	30	25.6
Good	82	70.1
Very good	5	4.3

VTE= venous thromboembolism

Table 3 shows nurses' VTE and thromboprophylaxis practices and experiences during the Covid-19 period. When Table 3 is examined, it was determined that 82.1% of the nurses had no problems with thromboprophylaxis during the Covid-19 period, 61.5% experienced VTE in patients with a diagnosis of Covid-19 in their clinics, moreover, 30.6% of them had DVT, 68.1% had a pulmonary embolism, 62.52% had a cardiac embolism and 31.9 of them experienced neurological events. After VTE, 73.0% of the nurses stated that their patients died in their clinics, 62% of them developed complications and 29.7% of them stated that permanent sequelae occurred. Furthermore, it was determined that 50.4% of the nurses preferred the pharmacological thromboprophylaxis method when they had Covid-19 (Table 3).

Table 2. Nurses' knowledge and practices on thromboprophylaxis

Thromboprophylaxis Information and Practices	n	%
Knowledge of protocol/scale specific to VTE risk assessment		
Yes	9	7.7
No	108	92.3
State of performing VTE risk assessment		
Yes	82	70.0
No	35	30.00
Frequency of VTE risk assessment (n=82)		
Once per shift	32	39.2
Once on the first admission to the clinic	15	18.3
Every hour of monitoring	26	31.7
According to the doctor's order	9	10.8
Frequently preferred method for thromboprophylaxis		
<u>Pharmacological method*</u>		
Heparin infusion	43	36.8
Clexane	112	95.7
Coumadin	55	47.0
Other	11	9.4
<u>Mechanical method *</u>		
Antiembotic socks	116	99.1
Graduated compression stockings	6	5.1
Intermittent pneumatic compression	10	8.5
Nursing practices related to thromboprophylaxis applied to patients		
Monitoring patients for the effects of anticoagulants	99	84.6
Educating patients and their families about anticoagulants	48	41.0
Educating patients and their families about VTE prevention and treatment	35.0	41.0

*= more than one answer has been given, VTE= venous thromboembolism.

4. Discussion

It has been stated in the literature that the incidence of venous thromboembolism has increased with the onset of Covid-19. It has been reported that thromboinflammation plays an important role in the pathogenesis of Covid-19, with a tendency to be more common in critically ill patients (intensive care patients) and associated with a high risk of VTE in approximately 20% of cases (Schulman et al., 2020). Nurses are often faced with such complications, especially in intensive care units. It is important that nurses working in these fields have sufficient knowledge and skills in terms of practice for VTE (Ma et al., 2018).

In this study, it was determined that 62.4% of the nurses did not receive in-service training on thromboembolism and prophylaxis, and 25.6% had poor knowledge. In a study by Eryiğit et al. (2006) stated that nurses did not receive in-service training on DVT. In the study

conducted by El-SayedEad et al. (2017), they determined that nurses had not previously attended any training course on nursing care standards for preventing DVT. In the study conducted by Bhatti et al. (2012) on the knowledge, attitudes and practices of health personnel towards DVT prophylaxis in five different training and research hospitals, it was reported that the knowledge of health personnel about DVT prophylaxis was weak. In the study conducted by Al Muggeed (2018), it was determined that 47.3% of the nurses gave correct answers to the questions about the risk factors of DVT, and the majority of the nurses answered "wrong" or "I don't know". In another study, it was observed that 9.3% of 452 nurses received in-service training on VTE (Oh et al., 2017). Considering the results of the study, it was determined that the nurses were not sufficiently informed about VTE and the study showed similarities with the literature. This situation was thought to be due to the fact that nurses' knowledge about VTE was limited to formal education and their awareness was low.

Table 3. Nurses' VTE and thromboprophylaxis practices and experiences in the covid-19 period

	n	%
The situation of having problems in the application of Covid-19 thromboprophylaxis		
Yes	21	17.9
No	96	82.1
The status of experiencing VTE in patients with a diagnosis of Covid-9		
Yes	72	61.5
No	45	38.5
VTE Type *		
DVT	22	30.6
Pulmonary embolism	49	68.1
Cardiac embolism	45	62.5
Neurological embolism	23	31.9
Other	6	8.3
Patient outcomes after VTE *		
Died	54	73.0
The complication has developed	46	62.2
Permanent sequelae occurred	22	29.7
Other	5	6.8
Thromboprophylaxis methods that nurses apply to themselves in Covid-19		
Pharmacological method	59	50.4
Mechanical method	4	3.4
Pharmacological and Mechanical method	8	6.8
I didn't use anything	23	19.7
I didn't have Covid-19	23	19.7

*= more than one answer has been given, VTE= venous thromboembolism, DVT= deep vein thrombosis.

In this study, it was determined that 7.7% of the nurses knew the scale and protocol for VTE risk assessment, and 70% of them performed VTE risk assessment in their clinics. In the study conducted by Bozkaya et al. (2017) only one nurse stated that the scale was known but not used. In the same study, when the VTE risk assessment status of the nurses was examined, it was determined that 77.6% of them made a risk assessment. In line with these results, it was thought that the knowledge level of nurses about VTE risk assessment was weak, but they were doing this because they had risk assessment in the standard care steps in their clinics, but they were not aware of it.

It was determined that 61.5% of nurses in intensive care units encountered VTE complications during the Covid-19 period, and the frequency of these was pulmonary embolism, cardiac embolism, neurological embolism, and DVT, respectively. In the study by Klok et al. (2020) in Covid-19 intensive care units, pulmonary embolism was found to be 81% as thromboembolism. In the prospective cohort study of Bahloul et al. (2019), it was found that 10.1% of patients who stayed in the intensive care unit for more than 48 hours were diagnosed with pulmonary embolism and this diagnosis prolonged the hospital stay of the patients. It has been supported by studies that patients hospitalized in intensive care units are at risk of pulmonary embolism, and this risk is especially high in Covid-19 patients. Covid-19 causes direct endothelial cell damage in the venous system and participates in the blood circulation of the damaged endothelial cells. Pulmonary embolisms accompanied by sudden oxygenation, respiratory distress, and hypotension are more common in patients (Scialpi et al., 2020). The present study is similar to the literature.

It has been determined that pharmacological methods are mostly preferred for VTE prophylaxis in intensive care units and Clexanee (enoxaparin) is used most frequently. In a study, it was determined that 97.6% of enoxaparin was used as prophylaxis in patients hospitalized in the intensive care unit with Covid-19 (Santoliquido et al., 2020). In the study conducted by Pieralli et al. to determine the incidence of deep vein thrombosis in patients with Covid-19 pneumonia who were not in the intensive care unit in 2021, enoxaparin was found to be used 95.6% (Pieralli et al., 2021). It is seen that the use of enoxaparin, which is one of the pharmacological methods for thromboprophylaxis in the Covid-19 pandemic, is the majority and the study is similar to the literature.

In this study, it was determined that antiembolic stockings were used most frequently. Milinis et al. (2018) stated in their study that graduated compression stockings are used in addition to pharmacological prophylaxis in patients undergoing orthopedic and abdominal surgery, and other mechanical prophylaxis methods are also used, in which the use of graduated compression stockings is insufficient. Tyagi et al. (2018) applied intermittent pneumatic compression device to

3400 patients who had total knee prosthesis and total hip replacement surgery, the incidence of VTE was found to be 0.8% and they reported that it was significantly effective when compared to the incidence in the control group (1.5%). It is thought that the frequent preference for antiembolic stockings may be due to their low cost. However, it is seen in this study that this method is not used alone, it is supported by pharmacological methods, and it has been seen in the literature that similar studies are recommended to increase and reveal the effectiveness on this subject.

5. Conclusion

In the study, it was determined that intensive care nurses generally followed the risk factors of venous thromboembolism, but they did not do it consciously. Moreover, it was determined that the majority of them encountered VTE during the Covid-19 period and pharmacological methods were most frequently preferred in their clinics. As a result of this study, it can be suggested that intensive care nurses' in-service training on VTE should be improved and constantly updated, and patient care should be handled more carefully in terms of VTE in pandemics with physiological effects like Covid-19.

Limitations

Our study had several limitations. First, since the study was conducted in one of the six regions of Türkiye, its generalizability is limited. The second is the difficulty and limitation of reaching nurses due to the epidemic.

Author Contributions

The percentage of the author(s) contributions is present below. All authors reviewed and approved final version of the manuscript.

	N.E.	H.Y.	D.T.	Ö.C.
C	25	25	25	25
D	25	25	25	25
S				100
DCP	40	30	30	
DAI	40	30	30	
L	40	30	30	
W	30	20	20	30
CR	25	25	25	25
SR				100
PM				100
FA	40	30	30	

C=Concept, D= design, S= supervision, DCP= data collection and/or processing, DAI= data analysis and/or interpretation, L= literature search, W= writing, CR= critical review, SR= submission and revision, PM= project management, FA= funding acquisition.

Conflict of Interest

Authors declared that there is no conflict of interest.

Ethical Approval/Informed Consent

Academic Committee Decision and Ethics Committee approval (approval date: May 15, 2021, protocol code: 2021/8-276) were obtained before starting the research. This study was conducted according to the principles of the Declaration of Helsinki.

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