

Nursing- led Patient Training Effect on Post-operative Patients' knowledge and Practices Regarding Deep Venous Thrombosis

Hassnaa Eid Shaban Mosa¹, Nevin Adel Amer²,
Amera Bekhatroh Awed Allah Rashed³

^{1,2}(Medical Surgical Nursing Department, Faculty of Nursing, Menoufia University, Egypt)

³(Maternal and Newborn Health, Nursing Department, Menoufia University, Egypt)

Corresponding Author: Hassnaa Eid Shaban Mosa.

E-mail: baajlaan@gmail.com.

Abstract: Deep vein thrombosis (DVT) is a common largely preventable condition. The Agency for Healthcare Research and Quality reports that, DVT prophylaxis is among the top-10 strongly suggested practices for improving patient safety. Aim of the study: was to evaluate the nursing- led patient training effect on post-operative patient's knowledge and practices regarding deep venous thrombosis. Design: Quasi-experimental research design was used to achieve the aim of the study. Setting: The study was carried out at General Surgical Department of Menoufia University Hospital - Menoufia University - Egypt .Subjects: A convenient sample of 129 patient whom comprising all patients admitted to the department during first six months of 2018 and met the inclusion criteria, but only 125 patients completed the study with 4 patients drop out (2 refused to continue postoperative and 2 died within the day of surgery). Three Tools were used for data collection; DVT an interviewing questionnaire, patient's DVT knowledge questionnaire and patients' self-care practices regarding DVT questionnaire. Results: The mean age of studied sample was 45.60 ± 4.29 in study group versus 48.40 ± 4.29 in control group with no statistically significant differences between both groups. The mean total knowledge score was 7.3 ± 2.7 in study group versus 3.71 ± 1.72 in control group in the second postoperative day with statistically significant differences between both groups. The mean total practice score was 16 ± 1.7 in study group versus 11 ± 2.47 in control group with high statistically significant differences between both groups. Conclusion: The study concluded that patients' knowledge levels regarding DVT increased to a statistically significant level with the nursing training. In addition, performance of DVT protective practices increased significantly in those who applying the Nursing led patient training. Recommendations: Development of new trainings augmented with different educational materials as video, models, web pages, smart phone applications, brochures with visual aids to be provided to patients regarding DVT.

Keywords: Nursing- Led, Training & Deep venous thrombosis.

Operational definition of nursing- led patient training: patients are trained and educated by the nurse about post-operative self-care practices to be applied against DVT as checking for signs of DVT, getting up of bed 1 day after surgery, lifting legs above heart level, changing positions in bed, performing deep breathing exercises, foot exercises and leg exercises in bed, wearing compression elastic stocking (CES), assessing leg circumference, foot pulse and legs temperature, increasing fluid intake and checking of anticoagulant side effects.

I. INTRODUCTION

Although there is an advanced medical progress and surgical treatment options, deep venous thrombosis (DVT) is still a serious post-operative problem which can lead to clinically critical outcomes as venous gangrene, chronic venous failure, pulmonary embolism and post thrombotic syndrome [1].

DVT is estimated to affect 1–2% of adults world-wide, with prevalence ranges from 15% to 75% among hospitalized patients. It usually affects lower extremities than the upper one, with more prevalence after general anesthesia than after regional anesthesia. Signs and symptoms usually appear in 75% of patients within the first 48 hours post-operatively and include leg heaviness, swelling, cramping, burning, throbbing, itching, aching and pain upon exertion [2] - [3].

Several factors can attributes to the development of DVT as venous trauma, venous circulation stasis and blood coagulation factor. The duration of the surgery also, type of anesthesia used, position during surgical procedure, length of immobility before and after surgery, hydration status, age, obesity and presence of infection or sepsis [4].

Primary prophylaxis practices are economical, easy-to-use and effective to augment venous return and blood circulation. These practices include early mobilization after surgery, foot leg exercises, leg elevation, deep-breathing exercises, adequate hydration, wearing compression elastic stockings and using pneumatic compression systems. It is crucial for health personnel to know and promote effective mechanical prophylaxis methods to prevent DVT and to encourage patient's participation in their own care. Nurses, play an important role in teaching patients about DVT and on how to perform these practices and checking whether the learned information and practices are correctly applied by the patients [5].

Anti-coagulant prophylaxis is the treatment of choice to prevent venous stasis and eliminate other risk factors. Postoperatively pneumatic compression devices is specifically effective as low-molecular-weight heparins. In addition to anticoagulant therapy and to enhance the protective effect, mechanical thrombo-prophylaxis are used especially with patients high risk for bleeding and anticoagulants are contra-indicated among them. For patients who receive care with mechanical thrombo-prophylaxis methods, optimal results can be obtained when caution is exercised during the implementation of the therapy[6].

Significance of the study:

DVT optimal prevention requiring both prescription and administration of prophylactic practices and medications, to date, most attempts to prevent problem have focused predominantly on primary prophylaxis practices rather than medication prescription. Despite the increasing incidence of post-operative deep venous thrombosis, the benefits of prophylactic practice of DVT in hospitalized patients, particularly after surgeries, are unclear. Furthermore assessing nursing patient training on patients self-care practices against DVT had limited insight globally. So the researchers decided to evaluate the nursing- led patient training effect on post-operative patient's knowledge and practices against deep venous thrombosis.

Conceptual framework:

The conceptual framework that guided this study was Orem's model which focuses on each individual's ability to perform self-care. This is defined as an application of the learned self-practices by the nurse to prevent possible complication,maintaining life, promote health and wellbeing. The basic premise of the model is that individuals can take responsibility for their health and to care for themselves [7].

Aim of study:

The aim of the study was to evaluate the nursing- led patient training effect on post-operative patient's knowledge and practices regarding DVT.

Study hypotheses:

1. The study group who receive the nursing led- training will exhibit more knowledge about DVT compared to the control group.
2. The study group who apply the nursing led- training will exhibits more satisfied and better self-care practices regarding DVT compared to the control group.

II. SUBJECTS AND METHOD

Study design:

Quasi experimental design (comparative study) was used to achieve the aim of the study

Setting:

The current study was conducted at General Surgical Department of Menoufia University Hospital - Menoufia University - Egypt.

Sample and sampling technique:

A convenient sample of 129 patient whom represent all patient admitted to the department during first six months of 2018 who met the inclusion criteria and agreed to participate in the study. (but only 125 patients completed the study with 4 patients drop out (2 refused to continue postoperative and 2 died within the day of surgery)

The study subjects were divided into two groups as follow:

Control group I: composed of 59 patient whom admitted to the department from the first of January 2018 to the end of March 2018.

Study group II: composed of 66 patient whom admitted to the department from the first of April 2018 to the end of June 2018.

Inclusion criteria:-

Patients aged more than 21 years old, conscious, able to communicate well, hospitalized at least 1 day before the surgery, planned to stay at the hospital for at least 2 days after the surgery, undergoing major surgery and had applied compression elastic stocking in the pre-surgical period and planned to be used after surgery, and willing to participate in the study.

Exclusion criteria:-

Patients with health problems that restrict mobilization, patient with history of previous DVT, vascular diseases, any psychological diseases, visual hearing and speech disabilities.

Data collection tools:-

Tool I:- An interviewing Questionnaire:

This questionnaire was designed by the researchers after reviewing the relevant literature. It aimed to collect data about patients biodemographic characteristics as age sex and level of education, patients clinical data as history of having previous surgery complication and previous history of DVT.

Tool II: Patient's DVT knowledge questionnaire:-

It was developed by Boulton et al., 2015 (8) and used to assess pre and post training information level about DVT as risk factors, signs and symptoms and methods used to prevent DVT. This instrument was given to the patient two times the first time was before training and the second was at the second day post-surgery.

Scoring system:- the responses for each question ranged from 1 to 3. 1= poor (no response, wrong answer) 2= average (less than 4 right responses) 3= good (≥ 4 right response).

Tool III: Patients' self-care practices regarding DVT questionnaire:

It was developed by the researchers after reviewing of relevant literature to assess post-operative patients' self-care practices against DVT after completion of training. It included 9 self-care practices for which patients received 2 points for each one they completed and one point for each one he did not completed. These practices included checking for signs of DVT, getting up of bed 1 day after surgery, lifting legs above heart level, changing positions in bed, performing deep breathing exercises, foot exercises and leg exercises in bed, wearing CES, assessing leg circumference, foot pulse and legs temperature, increasing fluid intake and checking of anticoagulant side effects if prescribed.

Validity of the instruments:

The structured tools (I, II & III) were tested for face and content validity by making jury with academic staff consisted of 3 medical surgical nursing professors and required modifications were done.

Reliability of the tools:

- Tools I and III were tested for reliability by the researchers using Test-retest method using person correlation coefficient formula and the scores were satisfactory with scores of 0.97 and 0.86 consecutively.
- Tool II reliability was tested by Boulton et al.,2015 (8) using inter-rater reliability and person correlation coefficient formula was used 0.79.

Methodology
Preparation of the colored guide booklet:-

- The guide booklet was designed by the researchers on the light of relevant literature. 3,9,10,11.
- It included definition of DVT, risk factors, signs and symptoms, prevention methods and practices and precautions during use of anticoagulants. It also contained 15 colored picture drawn by a computer graphic program. It was written in different font sizes and colors.
- The guide booklet was evaluated by 2 surgical professors at the Faculty of Medicine, Menofia University and a professor of Medical Surgical Nursing faculty of nursing Alexandria University and necessary applicable modifications were made.

Pilot study:-

- A pilot study carried out on 10% of cases (13 patients) whom met inclusion criteria after developing questionnaires and educational booklet. The pilot sample were excluded from the main sample.

Data collection:-

- all patients were interviewed by the researcher the day before surgery for about 45 mins. During which the researcher explained the purpose of the study and took patients oral consent to participate in the study.

Patient who agreed to participate in the study in the first 3 months of data collection period were included in control group (I) (No=59).

Each patient in control group (I) was given the interviewing questionnaire and the DVT knowledge questionnaire during the same first interview.

Patient who agreed to participate in the study during the second 3months of data collection period were included in study group (II) (No=66).

Each patient in study group (II) was asked questions of the interviewing questionnaire and the DVT knowledge assessment questionnaire during the same first interview.

- A colored copy from educational booklet was given to each patient in the study group (II) only.
- Patients in study group (II) were educated about DVT and trained by the researchers to demonstrate DVT prevention activities using the guide booklet for about 1 hour the day before surgery.

At the day of surgery before the operation by at least 2 hours the researcher interviewed each patient in study group (II) and asked patient to demonstrate previously learned DVT prevention practices and advised patient to start their performance as early as possible postoperatively.

In the second post-operative day all patients in the two studied groups was re-interviewed by the researcher and given patients DVT knowledge questionnaire and patients self-care practices regarding DVT questionnaire. Each patient were given about 30 min to give response to questionnaires.

1-Administration and ethical consideration:

1. Official letters were made by the researchers and approved by the Faculty of nursing then sent to Menoufia University Hospital authorities and it was approved to conduct this study after explanation of the study purpose.

2. An oral consent to participate in the study were taken from patients whom agreed to participate after explanation of the study purpose of study and reassurance that any information obtained would be confidential and would only be used for the study purpose.

3. Researchers emphasized that participation in the study was voluntary and patients confidentiality were assured through coding data. Patients were also informed that refusal to participate wouldn't affect their care.

Statistical analysis

The data collected were tabulated & analyzed by SPSS (statistical package for the social science software) statistical package version 25 on IBM compatible computer. Two types of statistics were done:

1) Descriptive statistics: were expressed as mean and standard deviation ($\bar{X} + SD$) for quantitative data or number and percentage (No & %) for qualitative data.

2) Analytic statistics:

1- Chi-square test (χ^2): It is the test of significance used to study association between two qualitative variables.

2- Mann-Whitney test (non-parametric test): is a test of significance used for comparison between two groups not normally distributed having quantitative variables.

3- T- test: is a test of significance used for comparison between two groups of normally distributed quantitative variables.

P-value at 0.05 was used to determine significance regarding.

- P-value > 0.05 to be statistically not significant.

- P-value \leq 0.05 to be statistically significant.

- P-value \leq 0.001 to be highly statistically significant [12].

III. RESULTS

Table 1: showed that, there were no statistical significant differences between study and control group in relation to studied demographic characteristics and clinical data (age, sex, educational level, history of previous surgery and history of DVT) with P value > 0.05.

Table 2: illustrated that, there were highly statistical significant differences among participants of study group before and after training regarding knowledge of DVT risk factors, signs and symptoms and methods of prevention ($p \leq 0.001$). while there were no statistical significant difference among participants of control group pre and postoperatively regarding the same variables ($p > 0.05$). Moreover, the table showed that there were no statistical significant differences among study and control group regarding knowledge of DVT, risk factors, signs and symptoms and methods of prevention preoperatively ($p > 0.05$) while there were highly statistical significant differences among study group and control group regarding the same variables postoperatively ($p \leq 0.001$).

Figure 1: revealed that there was no statistical significant difference between study and control group in the pre-operative total knowledge score about DVT ($p = 0.87$). there was high statistically significant difference between both groups in the second postoperative day ($p \leq 0.001$).

Table 3: explained that There were statistically significant differences between both groups regarding their performance of all assessed practices ($p \leq 0.001$) except for increasing fluid intake and taking prescribed anticoagulants there were no statistical significant difference between both groups ($p = 0.38$ and 0.66 respectively).

Figure 2: clarified that, there was high statistically significant difference between study and control group mean total performance score of anti DVT practices (16 ± 1.7 and 11 ± 2.47 respectively).

TABLE (1): DEMOGRAPHIC DATA OF BOTH STUDIED GROUPS.

Bio-demographic characteristics	Studied groups				χ^2	P value
	Study (n=66)		Control (n=59)			
	No.	%	No.	%		
Age (years):						
• $\bar{x} \pm SD$	45.60	± 4.29	48.40	± 4.29	0.18*	0.85
• Range	22	– 60	24	– 59		
Sex:						
• Male	39	59.1	35	59.3	0.07	0.78
• Female	27	40.9	24	40.7		
Educational level:						
• Primary education	11	16.6	9	15.3	0.80	0.22
• Secondary education	25	37.9	23	38.9		
• High education and above	30	45.5	27	45.8		
History of previous surgery:						
• Yes	14	21.2	15	26.7	0.08	0.76
• No	52	78.8	44	73.3		
Previous family history of DVT						
• Yes	2	3	0	0		0.89
• No	64	97	59	100	0.11	

(*): student's t test .

χ^2 = Chi square test.

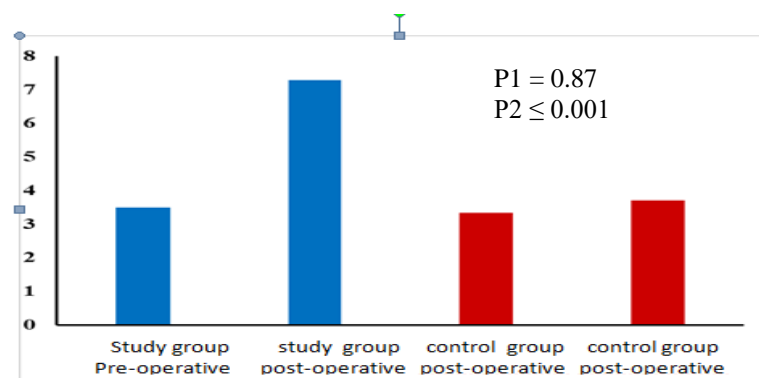
TABLE (2): KNOWLEDGE REGARDING DVT BEFORE AND AFTER SURGERY AMONG BOTH GROUPS.

DVT knowledge items	Studied groups								P value
	Study group (n=66)				Control group (n=59)				
	Before surgery		2 nd day post surgery		Before surgery		2 nd day post surgery		
	No	%	No	%	No	%	No	%	
Factors that increase DVT likelihood									
• Poor (no response)	60	90.9	0	0	50	84.7	45	76.2	
• Unsatisfactory <4 right responses.	6	9.1	16	24.2	9	15.3	14	13.8	P1=0.59 NS*
• Satisfactory ≥ 4 right response	0	0	50	75.8	0	0	0	0	P2≤ 0.001 HS*
χ^2 (Pvalue)			12.06	(0.001)			1.55	(0.215)	
Signs and symptoms of DVT									
• Poor (no response)	55	83.3	0	0	48	81.4	45	76.2	P1= 0.42 * NS
• average <4 right responses	11	16.7	9	13.7	11	18.6	14	23.8	P2≤ 0.001 * HS
• Satisfactory ≥ 4 right response	-	0	57	86.3	0	0	-	0	
χ^2 (Pvalue)			9.10	(0.001)			1.26	(0.351)	
Methods to prevent postoperative DVT									
• Poor (no response)	58	78.9	0	0	54	91.5	50	84.7	P1 = 0.76* NS
• Unsatisfactory <4 right responses	8	21.1	9	13.7	5	8.5	9	15.3	P2≤ 0.001* HS
• Satisfactory ≥ 4 right response	0	0	57	86.3	0	0	0	0	
χ^2 (Pvalue)			14.2	(0.001)			1.01	(0.403)	

* Chi-square test

P1: comparison between two group the day before surgery

P2: comparison between two groups two days postoperative



P1: comparison between two group the day before surgery

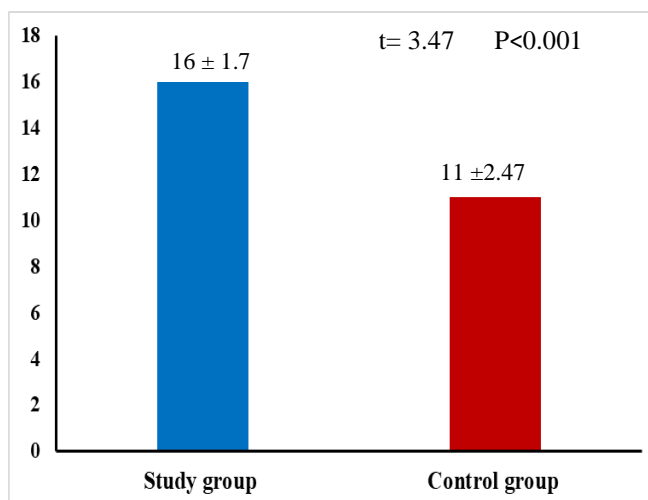
P2: comparison between two groups two days postoperative

FIGURE (1): TOTAL KNOWLEDGE SCORE OF BOTH STUDIED GROUPS BEFORE AND AFTER INTERVENTION.

TABLE (3): PATIENTS PERFORMANCE OF ANTI DVT PRACTICES IN THE SECOND DAY POST SURGERY BETWEEN BOTH GROUPS

Practices items	Studied groups				χ^2	P value
	Study n=66		Control n=59			
	No	%	No	%		
Standing up 1 day after the surgery.						
done	66	100	45	76.3	1.04	0.042*
Not done	0	0	14	23.7		
Changing position in bed at least every 2 hours.						
done	65	98.5	45	76.3	2.98	0.023*
Not done	1	1.5	14	23.7		
Deep-breathing exercises every 2 hours.						
Done	64	97	20	33.9	5.82	<0.001 **
Not done	2	3	39	66.1		
Doing leg exercise as (Lifting legs above heart level, Knee pulls, Foot pumps, Ankle circles) frequently.						
Done	66	100	36	61	27.77	<0.001 **
Not done	0	0	23	39		
Using elastic compression stockings.						
Done	66	100	45	76.3	1.04	0.042*
Not done	0	0	14	23.7		
Measuring leg circumference.						
Done	55	83.3	5	8.5	18.02	<0.001**
Not done	11	16.7	54	91.5		
Measuring pedal pulses .						
Done	55	83.3	5	8.5	18.02	<0.001**
Not done	11	16.7	54	91.5		
Increasing fluid intake.						
Done	66	100	50	84.7	0.88	0.38
Not done	0	0	9	15.3		
Taking anticoagulant if prescribed.						
Done	66	100	59	100	0.81	0.66
Not done	0	0	0	-		

(*):significant. (**): high significant



t: mann-whitney t test

FIGURE (2): TOTAL DVT RELATED PRACTICE SCORE AMONG BOTH GROUPS AFTER INTERVENTION.

IV. DISCUSSION

DVT is a preventable health problem through many prophylaxis practices. Nurses led patient education, training and counseling role is very important in preventing many surgical complications from the start of hospitalization to discharge and lifelong (13).

In relation to Patient's DVT knowledge.

The current study determined that; before training, the majority of studied participants in both groups had poor knowledge about risk factors for DVT which was in agreement with **Al zhoubi, et al., 2013** (14) who studied Awareness of patients who undergo cesarean section about venous thromboembolism prophylaxis and reported that, most patients didn't recognize the risk factors of DVT as obesity or immobility, but less than half of them recognized cesarean section and pregnancy as a risk factor for DVT. On the other hand the current study result was inconsistent with **Stephanie et al., 2008** (15) who studied Knowledge of Venous Thromboembolism (VTE) prevention among hospitalized patients and concluded that, most hospitalized patients were aware that receiving injections to prevent blood clots and knew that, immobility and surgery are risk factors for DVT and pulmonary embolism. This may be due to that the later illustrated that their studied participants knew that information from social media and TV programs.

Furthermore, the current study results showed that most of studied participants in both groups preoperatively had poor knowledge about signs and symptoms of DVT and preventive measures that was in agreement with **Stephanie et al., 2008** (15) who concluded that most of studied hospitalized patients had limited knowledge about symptoms and preventive modalities of DVT and pulmonary embolism .

In addition; the current study revealed that both studied groups had poor total score of knowledge about DVT which significantly increased postoperatively in study group II who recieved the nursing led training while did not significantly increased in control group and these results are in accordance with **Ays and Ayla 2018 study (5) who studied Nurse-led patient training improves deep vein thrombosis knowledge and self-care practices and Lee et al., 2014 study (16) about Evaluation of hospital nurses' perceived knowledge and practices of venous thromboembolism assessment and prevention;** both studies were reported a significant increase in the average deep vein thrombosis total knowledge score in their studied participants after nursing training than before. These results of the current study supports the first study hypothesis.

This significant improvement in studied participants knowledge scores had been explained by **Ays and Ayla 2018 and Al zhoubi, et al., 2013 (5 & 14)** whom told that patients need to be educated and receive adequate counseling by health

care providers using suitable efficient teaching materials to be able to easily recall information that help them to actively participate in their management plan.

Regarding patients practices against DVT

In the recent study, the patient's average postoperative self-care practice against DVT scores were significantly higher in study group than control group which was same as in **Aggarwal et al., 2015 (17)** study regarding Deep vein thrombosis (DVT) and pulmonary embolism: awareness and prophylaxis practices reported by patients with cancer who reported that , all the patients stated that they did not know how to measure a foot pulse and how to measure foot circumference after removing the CES. However, most of patients who received the training tools performed these practices professionally and repeatedly after training . Moreover, **Lavall and Costello ,2015 (18) ; Ays and Ayla 2018 (5)** added that , before the training all studied patients did not know the self-care practices to prevent DVT formation. However after training using the guide book, most practices were identified by the patients. In addition they started doing foot exercises in bed, standing up soon after surgery, frequent walking after surgery, deep-breathing exercises, doing leg exercises in bed and the use of CES. These findings agree with the second hypothesis of the current study.

The cause of practice improvement had been illustrated by **Qaseem et al., 2011 (19)** when he was study (Venous Thromboembolism Prophylaxis in Hospitalized Patients) and reported that , their study participants felt satisfied when DVT information was provided by health-care personnel using acolorred guidebook especially as each patient received a personal copy of the guidebook and this enforces understanding of information and efficient performance of self-care practices.

V. CONCLUSION AND RECOMMENDATIONS

CONCLUSION:

The study concluded that patients' knowledge levels about DVT increased to a statistically significant level with the nursing training. In addition, performance of DVT protective practices increased significantly in those who received Nursing led patient training, which indicating acceptance of the two study hypotheses.

RECOMMENDATIONS:

1- Recommendations for practices

- Development of new trainings to be provided to patients about DVT augmented with different educational materials as video, models, web pages, smart phone applications, brochures with visual aids.
- The prepared educational colored book should be printed and copied to be available for all patients at surgical wards.
- Nurses should use this prepared DVT guide booklet in patient training to help increase patients' DVT awareness and knowledge on how to protect themselves from DVT.

2- Recommendations for further research

- Additional studies should be conducted to compare the efficacy and advantages of the various educational materials with each other.
- Future studies to investigate the efficacy of improving knowledge and practices on decreasing DVT incidence methods including larger sample size.

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