

Prophylaxis and Risk Factors for Venous Thromboembolism (VTE): Knowledge and Practice of Surgeons

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1. Abstract

1.1. Background: Venous thromboembolism (VTE) is one of the most common medical problems with its most common complication pulmonary embolism (PE).

1.2. Objective: The aim of this study is to assess the knowledge and attitude of a surgeon regarding VTE risk factors and prophylaxis.

1.3. Method: This is a Cross-sectional study, in which the Survey is distributed randomly for all surgeons in the surgical departments at two medical institutions in Saudi Arabia between the period of October 2018 and April 2019.

1.4. Results: 172 surgeons were participating in this study with a response rate of 86% (172/200). 90.7% of the respondent surgeons are male. The mean score of knowledge is found to be 8.68 ± 1.47 out of 10 (86.8%) and that of attitude is 12.64 ± 1.53 out of 15 (84.27%).

1.5. Discussion: Both knowledge and attitude score percentages are higher than 75% which is the minimally acceptable level, accordingly, surgeons in both medical centers achieved an acceptable level of knowledge and good attitude.

1.6. Conclusion: As a conclusion, the surgeons VTE knowledge and attitude are acceptable in both medical institutions, where residents score the least scores, indicating the need for education and awareness programs regarding VTE risk factors and prophylaxis.

2. Keywords: Venous thromboembolism (VTE); Surgeons; Knowledge; Attitude; Awareness

3. Introduction

Venous thromboembolism (VTE) is one of the most common medical problems with its most common complication pulmonary embolism (PE). Patients are predisposed to venous thrombosis if they fulfill the elements of Virchow's triad discussed by Rudolf Virchow, a German pathologist, in 1856. These are venous stasis, endothelial injury, and hypercoagulability [1]. Venous stasis occurs secondary to long periods of immobilization in the operating room and delayed, limited, or impaired postoperative ambulation.

Endothelial injury can result from either a direct injury to the deep veins or the surrounding tissue of the lower extremities or indirectly by a hematoma or thermal injury [2]. The annual incidence of VTE in the US is estimated to be 350,000- 900,000 of which approximately 100,000 die. Of those that survive, 30-50% will go on to develop post-thrombotic syndrome and as high as 30% will develop a second DVT within 5 years [3]. Surgeon awareness to VTE risk factors, symptoms, prophylaxis and treatment are vital and essential for any medical institution. The aim of this study is to assess the knowledge and attitude of a surgeon regarding VTE risk factors and prophylaxis.

4. Method

This is a Cross-sectional study, in which the Survey is distributed randomly for all surgeons in the surgical departments in each of the involved medical institutions between the period of October 2018 and April 2019. Two medical institutions were involved: Prince Sultan Military Medical City (PSMMC) known as Riyadh Armed Forces Hospital located in Riyadh, which is considered as one of the most advanced medical centers in the Middle East with a capacity of about 1200 beds, accredited by the Joint Commission International. And King Abd Allah University Hospital (KAAUH) which is located in the southern area of Princess Noura University (PNU) Campus, a 300-bed teaching hospital serving PNU faculty, students and community. This Survey is adapted from two studies[4-5]. *The survey is consisting of three parts:* Part 1: Demographic data, consisting of 4 items. *Part 2: Evaluation of surgeon's knowledge, consisting of 10 items, these items are scored from 0 to 10, in which 10 represents 100% of knowledge.* *Part 3: Evaluation of surgeon's Attitude, consisting of 3 items, these items are scored from 3 to 15, where 15 represents 100% of the best attitude.* In this study, 75% is considered an acceptable level for both knowledge and attitude. Content validity, face validity, and criterion validity were done as a pre-test for this questionnaire, then the researcher distributed the instrument to 10 respondents, in order to gather their comments, and check the consistency in their responses. After all the required changes according to pre-test results have been done, the researcher distributed the questionnaire to gather minimum of 50 responses to be able to run the reliability measure, the value of Cronbach's alpha (after deleting some items) is 0.813, indicating that the questionnaire is measuring what it's supposed to measure.

5. Results

The researcher distributed 200 questionnaires in both centers, 172 were retrieved with a response rate of 86% (172/200). **Table 1** shows the results of the demographic analysis of 172 surgeons. Results indicate that 90.7% of the surgeons in the survey are male and only 9.3% are female. Age categories show 66.86% of surgeons aged between 30 and 45 years, 6.4% are below 30 years of age, 23.84% are aged between 45 and 60 years and only 3.91% surgeons are above 60 years. In the present survey, 74.42% are orthopedic surgeons, 16.86% are general surgeons and only 2.91% are urologists. Related to qualifications, 41.86% surgeons are specialist in their field, 36.05% are consultant, 10.47% are senior residents and 11.63% are junior residents.

Table 2 presents the frequency analysis results of knowledge of surgeons. For the first question about which have more probability for DVT risk, 85.47% of surgeons think persons more than 40 years of age have more probability of DVT

risk. The second question about risk factors for DVT, 87.79% think general anesthesia with more than 30-minute duration increased DVT risk. For the third question, 87.79% of surgeons consider Hypercoagulability, stasis and vascular injury as the most important mechanisms for DVT risk during surgery. When surgeons were asked about pulmonary embolism, 94% think that DVT is the most common source of pulmonary embolism. 88.37% of surgeons considered surgery duration with less than 30 minutes is not a risk factor for DVT. "Which one of the following statements reflects the outcome of DVT without treatment?" 89.53% of surgeons considered all the three outcomes of DVT without treatment (listed in table 2). 86.05% consider "Warfarin with INR of 2.5-3 "not applicable for DVT prophylaxis during surgery. According to 96.51% of surgeons believe that selection of DVT preventive measures can be determined by both the number of risk factors and the type of surgery. In pulmonary thromboembolism, 7.56% found normal chest X-ray as not a correct diagnosis, 2.91% said DVT is not the common source and 82% said the most common cause of cyanosis in surgery is not correct in pulmonary thromboembolism. The last question of knowledge section of surgeons was "Diagnosis and beginning of therapy for pulmonary thromboembolism is based on" 70.355 said clinical suspicious is enough for diagnosing and initial therapy for pulmonary thromboembolism, 21.51% consider clinical criteria and 8.14% thought about sophisticated imaging.

Table 1: Frequency Analysis of Demographic Characteristics.

Gender	N	Percentage
Male	156	90.70%
Female	16	9.30%
Age		
Less than 30 years	11	6.40%
30-Less than 45 years	115	66.86%
45-less than 60 years	41	23.84%
60 years and above	5	2.91%
Specialization		
General Surgeon	29	16.86%
Orthopedic Surgeon	128	74.42%
Thoracic Surgeon	10	5.81%
Urologist	5	2.91%
Qualification		
Consultant	62	36.05%
Specialist	72	41.86%
Senior Resident	18	10.47%
Junior Resident	20	11.63%

N= number of respondents

Table 2: Frequency Analysis of “knowledge of surgeons” sections.

Questions	N	Percentage
1. Which one of the following variables had more probability of risk for DVT?		
Males	5	2.91%
Females	18	10.47%
A person less than 30 years old	2	1.16%
A person more than 40 years old	147	85.47%
2. Which one is correct?		
Any duration for general anesthesia increased risk of DVT	16	9.30%
General anesthesia only in abdominal or pelvic surgery raised the risk of DVT	5	2.91%
General anesthesia with more than 30-minute duration increased DVT risk	151	87.79%
3. What is the most important mechanism or mechanisms of DVT risk during surgery?		
Hypercoagulability	5	2.91%
Stasis	15	8.72%
Vascular injury	1	0.58%
All of them	151	87.79%
4. Which one is correct?		
Calf DVT had a 40% probability of pulmonary embolism.	10	5.81%
DVT is the most common source of pulmonary embolism.	162	94.19%
5. Which one is not a risk factor of DVT?		
Cardiac failure	4	2.33%
Peripartum state	5	2.91%
OCP consumption	11	6.40%
Surgery duration with less than 30 minute	152	88.37%
6. Which one of the following statements reflects the outcome of DVT without treatment?		
Proximal extension	4	2.33%
Limitation by fibrinolysis or organization in calf DVT	10	5.81%
Embolization risk increased	4	2.33%
All of the above	154	89.53%
7. Which one has not applicable for DVT prophylaxis during surgery?		
Intermittent pneumatic compression	5	2.91%
Low dose heparin	14	8.14%
Warfarin with INR of 2.5-3	148	86.05%
Elastic stocking	5	2.91%
8. Selection of DVT preventive measures determined by		
Number of risk factors	5	2.91%
type of anesthetic drug	1	0.58%
a and b (a. Number of risk factors b. Type of surgery)	166	96.51%
9. In pulmonary thromboembolism which one is not correct?		
The most common cause of preventable mortality in hospital	13	7.56%
DVT is the most common source	5	2.91%
The most common cause of cyanosis in surgery	141	81.98%
Most of them have normal chest X-ray	13	7.56%
10. Diagnosis and beginning of therapy for pulmonary thromboembolism is based on		
Clinical criteria	37	21.51%
Sophisticated imaging	14	8.14%
Clinical suspicious is enough	121	70.35%

N= number of respondents

For the attitude questions are shown in **Table 3**, cumulatively, around 95% of surgeons consider that sensitive and objective test is necessary for DVT screening in post-surgical patients. 2.91% of surgeons consider it low to the detection of DVT risk factors prior to surgery, 13.37% consider it as average, 32.56% consider it

highly recommended and 51.16% recommended it very highly to detect for DVT risk prior to surgery. 95% of surgeons (25.58%+ 69.19%) think DVT prevention very necessary in surgery.

Table 3: Frequency Analysis of “ Evaluation of Surgeons’ Attitude” Section.

Questions	N	Percentage
1. How much know the sensitive and objective tests (Duppler sonography) necessary for DVT Screening in post-surgical patients?		
Average	6	3.49%
High	44	25.58%
Very high	119	69.19%
2. How much detection of DVT risk factors is necessary prior to surgery?		
Low	5	2.91%
Average	23	13.37%
High	56	32.56%
Very high	88	51.16%
3. How much DVT prevention is necessary for surgery?		
Average	6	3.49%
High	44	25.58%
Very high	119	69.19%

DVT= Deep Vein Thrombosis, N= number of respondents

Table 4 shows the results of the regression analysis for the scores evaluated from the knowledge of surgeons’ part. It was assumed that age, gender, specialization, and qualification have no impact on scores of knowledge of surgeons. The p-value of individual t-test is significant (p-value < 0.05) for gender, specialization and qualification and insignificant (p-value>0.05) for age. The value of R-square for this model is 0.419 indicating that 41.9% variability in scores of knowledge of surgeons is due to their age, gender, qualification and specialization and 58.1% is due to other factors.

Table 5 presents the results of regression analysis for the impact of age, gender, specialization, and qualification on scores of attitudes of surgeons. P-value of the t-test is low for gender and qualification (P-value < 0.05) and high for age and specialization (p-value>0.05). A significant p-value of gender and qualification shows that gender has an impact on the surgeon’s attitude. Similarly, being a consultant, specialist, senior or junior resident also has an impact on the attitude of surgeons. The value of R-square for this model is 0.25 indicating that 25% variability in the scores of attitudes of surgeons towards surgery is due to age, gender, specialization, qualification and 75% is due to other factors.

Table 6 presents the correlation analysis of the demographic characteristics of surgeons with their scores of knowledge and attitude. Age and scores of knowledge have a positive but weak relationship which indicates that the increase in age has an increasing relation with scores of knowledge and scores of attitudes of surgeons. The value of correlation for qualification with both scores is negative indicating that from consultant (1) to junior residents (4), the value of both scores decreases. The value of scores of knowledge and specialization of surgeons is

also negative showing more knowledge scores for DVT risk by general surgeons and fewer scores of knowledge by orthopedic surgeons. Gender has also a negative relationship with both types of scores showing more scores for males and fewer scores for females.

Table 7 presents the results of the two-sample t-test assuming equal variances. The mean scores of knowledge are found to be 8.68 ± 1.47 and that of attitude is 12.64 ± 1.53 . The percentage represents the mean value contribution out of total scores of knowledge and attitude respectively. Minimum scores in knowledge and attitude are 5 and 8 respectively while maximum scores found are 10 and 15 for both types of scores.

Table 4: Regression for scores of knowledge of surgeons.

Model	Estimates	t-statistic	P-value
Intercept	13.6178	17.3659	0.0000
Age	0.0448	0.2425	0.8087
Gender	-0.9840	-3.0602	0.0026
Specialization	-1.3467	-8.4710	0.0000
Qualification	-0.6745	-6.0783	0.0000

Table 5: Regression for Scores of Attitudes of Surgeons.

Model	Estimates	t-statistic	P-value
Intercept	16.1882	17.4574	0.0000
Age	-0.1361	-0.6235	0.5338
Gender	-1.7381	-4.5711	0.0026
Specialization	-0.0861	-0.4578	0.6477
Qualification	-0.5956	-4.5390	0.0000

Table 6: Correlation of demographic characteristics of surgeons with their scores of knowledge and attitude.

Demographic Characteristics	Scores of Knowledge	Scores of Attitude
Age	0.1943	0.2547
Gender	-0.109	-0.3693
Specialization	-0.4003	0.1158
Qualification	-0.4045	-0.3963

Table 7: Comparison of two types of scores.

Measures	Scores of knowledge	Scores of Attitude	P-value
Mean	8.68	12.64	0.000
percentage	86.8%	84.27%	
Minimum	5	8	
Maximum	10	15	
SD	1.47	1.53	

6. Discussion

As it's clear from the results most of our respondents are males (90.70%), indicating that females' surgeons in both medical centers are of low numbers. The mean score of knowledge is 8.68 out of 10, with a percentage of 86.8%. While the mean score of attitude is 12.64, with a percentage of 84.27%. Both

knowledge and attitude score percentages are higher than 75%, accordingly, surgeons in both medical centers achieved an acceptable level of knowledge and good attitude. Depending on regression and correlation analysis of demographic characteristics of surgeons with their scores of knowledge and attitude, higher scores are associated with a higher level of qualification, where consultant achieved the highest scores in both medical centers, and junior residents achieved the least scores in the involved medical centers. Additionally, higher scores were achieved by general surgeons more than the orthopedic surgeons, likewise, male surgeons score higher scores than female surgeons. Since the least scores are recorded by the junior and senior residents, the authors recommend arranging educational and awareness programs regarding VTE risk factors and prophylaxis for these resident physicians to enhance their level of VTE awareness and knowledge.

7. Conclusion

This is a cross-sectional study that assesses the knowledge and attitude of the surgeon regarding VTE risk factors and prophylaxis. In both medical centers, the surgeons achieved an acceptable level of VTE knowledge and best attitude, where residents score the least scores, indicating the need for education and awareness programs regarding VTE risk factors and prophylaxis.

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