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Knowledge and Awareness among Registered Nurses in the Prevention of Venous Thromboembolism (VTE) for High-Risk Antenatal and Postnatal Mothers

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ABSTRACT

Background: There is an increment in the incidence of venous thromboembolism (VTE) among the Asian population. This study is conducted to investigate the level of knowledge and awareness of the nurses regarding VTE. **Methods:** A cross-sectional descriptive study was conducted with 170 respondents fulfilling the inclusion criteria. The respondents' knowledge and awareness were assessed by using an individual VTE self-efficacy items with 5-point Likert scale. **Results:** The finding shows no significant relationship between age, education level, nurse grade, experience, attend CNE with the level of knowledge. There is significant relationship between attending CNE and level of awareness. **Conclusion:** In this study, it was discovered that the level of knowledge and awareness among nurses in the government hospital were at good level. However, more studies should be conducted to compare among the hospitals. This will help to capture a clear picture regarding nurses' knowledge and awareness regarding VTE management.

Keywords: Venous Thromboembolism; Knowledge; Awareness; Nurses

INTRODUCTION

Pulmonary Embolism is reported to be one of the leading causes of direct maternal death (Simcox *et al.*, 2015) in developing countries including Malaysia. There is an increment in the incidence of venous thromboembolism (VTE) among the Asian population. Obstetric VTE was announced as the main fatality of maternal death in Malaysia (Ministry of Health Malaysia, 2013). Obstetric VTE use to be rare in Asia (Clinical Practice Guidelines, 2013). However, it was alarming that about 10% would face fatality within the first month of VTE diagnosis (Clinical Practice Guidelines, 2013). All deaths related to VTE during pregnancy may be prevented if the necessary actions are taken to curb this health problem from becoming major for mothers (Clinical Practice Guidelines, 2013; Ekwere *et al.*, 2015). Therefore, it is time to identify the level of knowledge and awareness among registered nurses regarding pathogenesis, clinical diagnosis, treatments, complications and preventive steps that may be taken by pregnant mothers.

Literature Review

Nurses Knowledge and Awareness on VTE

Performance of daily assessment of DVT prophylaxis is best done by nurses (Ma *et al.*, 2018). An experimental study by Sarkar & Ray (2018) on the effectiveness of a structured teaching programme among the clinical nurses' perceived knowledge and practice in deep vein thrombosis, major background factors of clinical nurse such as age, sex, education, experience and previous exposure to any DVT class was considered (Zobeiri & Najafi, 2011).

According to Lee *et al.*, (2014), the main hindering factor to perform VTE risk assessment was knowledge deficiency among the nurses, who are supposed to advocate between the patients and the physicians. Lee's team further emphasized that a prominent relationship exist between nurses' performance in providing the elastic stockings application and guiding in range of motion exercise. It is clearly supported that training for the staffs help to reduce DVT case (Boddi *et al.*, 2014;

Tang *et al.*, 2015; Oh, Boo & Lee, 2017), and serve as part of the VTE prophylaxis in general.

Moreover, Lee *et al.*, (2014) reported that the nurses mostly scored between fair (28%) and good (44%) in terms of their perceived knowledge on VTE assessments and preventions. Separately, the increase in awareness can assist nurses to educate the patients on the dangers, symptoms, treatments and interventions (Das, Sahoo & Swain, 2014), that may be taken to reduce the health problem as well morbidity rates among patients.

METHODOLOGY

Research Design and Sample

This is a cross-sectional quantitative descriptive study to investigate the knowledge and attitudes on the prevention of risk VTE among registered nurses of a public hospital in Klang Valley. A simple random sampling was used on 170 registered nurses who were working full-time in the hospital and volunteered to participate in the study. They were experienced in the Obstetrics and Gynecology ward for six months and above. The hospital is equipped with sufficient facilities for VTE and the best care services to the public.

Instrument

The study used the modified questionnaires by Lee *et al*., (2014). The respondents' knowledge is assessed by using a 5-point Likert scale an individual VTE self-efficacy items. Respondents were to answer 36 open-ended questions which will determine their level of knowledge on VTE regarding the risk factors, symptoms, treatments and preventions. The checklist is formulated by adapting from previous research by Das, Sahoo & Swain (2014).

Section A: Socio demographic data, which includes seven items on gender, age, years of experience and working unit, DVT previous knowledge and how the participant acquired knowledge. Section B: consists of DVT knowledge, ranging from the basic knowledge such as definition, pathophysiology, signs and symptoms, risk factors, complications, diagnostic investigations, management and prevention.

Each of the correct answer would indicate one mark and wrong answer indicate zero. Maximum score is 36. The scores are categorized as: 'good knowledge" (25-36 scores); 'average knowledge' (13-24 scores); and 'poor knowledge' (0-12 scores). Level of Awareness checklist was given to assess the awareness on prevention of DVT. The scores are categorized as: 'good awareness" (13-18 scores); 'average awareness' (6-12 scores) and 'poor awareness' (0-5 scores).

RESULTS

Socio-Demographic Data of Respondents

A total of 200 questionnaires have been distributed, but only 170 were returned with a percentage of 85.0%. The highest respondent is 75(44.1%) who were on the average age of 30-39 years old, whereas the lowest respondent is 20(11.8%) who were in the age group of 50- 59 years. Out of 170, 99 respondents (58.2%) were Diploma holders, 55(32.4%) with advance diploma/post basic. Meanwhile, only 8(4.7%) of respondents is with certificate of nursing. The number was same with respondents from Bachelor of Nursing. Most of the registered nurses 47(27.6%) had working experience of 6-10 years, 43(25.3%) had working experience of 11-20 years and 36(21.2%) had working experience of 21-30 years. The majority of the participants, 113 (66.5%) were staff nurses from grade U29 and 50 (29.4%) nurses from grade U32 (nurse manager); while the minority group was from top management (U36 and U42) with 5 (2.9%) and 2 (1.2%) respectively. Majority of them, 106(62.4%) attended the courses or continuous nursing education (CNE) on VTE.

Table 1: Socio Demographic Data of Respondent (N=170)

Sociodemographic Data		Frequency	Percent
Age	20-29yrs	40	23.5
	30-39yrs	75	44.1
	40-49yrs	35	20.6
	50-59yrs	20	11.8
Level of Education	Certificate of Nursing	8	4.7
	Diploma of Nursing	99	58.2
	Advance Diploma/Post Basic	55	32.4
	Bachelor of Nursing	8	4.7
Years of Nursing Experience	<5years	40	23.5
	67years	47	27.6
	1120 years	43	25.3
	2130 years	36	21.2
	>30years	4	2.4
Nursing Grade	U 29	113	66.5
	U 32	50	29.4
	U 36	5	2.9
	U 42	2	1.2
Attend CNE	Yes	106	62.4
	No	64	37.6
Total	170	170	100

The results in Table 2 showed 'good knowledge' among 162(95.3%) nurses regarding the management of VTE. There was only 'average' level of knowledge among 8(4.7%) nurses who were unsure regarding management of VTE.

Table 2: Frequency Table of Knowledge of VTE among Registered Nurses (n=170)

Questions	The Right Answer	The Wrongly Answer	Correctly Answer	Total
B1.VTE in pregnancy and puerperium most likely to be related to venous static, due to physiological changes in pregnancy.	Yes	2 (1.2)	168 (98.8)	170 (100.0)
B2. Clot formation in blood vessel is called Deep Vein Thrombosis (DVT).	Yes	1 (0.6)	169 (99.4)	170 (100.0)
B3. DVT has been attributed to increased venous static in the left leg related to compression.	Yes	50 (29.4)	120 (70.6)	170 (100.0)
B4. Doppler analysis ultrasound is specific for symptomatic proximal vein thrombosis.	Yes	12 (7.1)	158 (92.9)	170 (100.0)
B5. An elevation in D-Dimmers is a significant test for Pulmonary Embolism presentation.	Yes	29 (17.1)	141 (82.9)	170 (100.0)
B6. Anti-thrombin deficiency is the most common inherited cause of DVT.	Yes	45 (26.5)	125 (73.5)	170 (100.0)
B7. Application of graded elastic compression stockings (GECS) is non pharmacologic therapy prophylaxis.	Yes	9 (5.3)	161 (94.7)	170 (100.0)
B8. Aspirin and prophylactic dose LMWH (Low Molecular Weight Heparin) is preferred in women who have previous pre-eclampsia or IUGR (intra uterine growth restriction).	Yes	21 (12.4)	149 (87.6)	170 (100.0)
B9. Warfarin with INR monitor is not safe for all mothers with renal impairment.	No	124 (72.9)	46 (27.1)	170 (100.0)
B10. LMWH should not be dosed by actual weight and capping the dose is not recommended.	No	101 (59.4)	69 (40.6)	170 (100.0)
B11. The dose for fondaparinux is 10mg daily for body weight >100kg.	Yes	48 (28.2)	122 (71.8)	170 (100.0)
B12. Warfarin is contraindicated during pregnancy and therefore Heparin is safe for the treatment.	Yes	13 (7.6)	157 (92.4)	170 (100.0)
B13. Before giving Heparin therapy, blood samples of PT and APTT/INR (Prothrombin time) should take to establish a baseline.	Yes	37 (21.8)	133 (78.2)	170 (100.0)
B14. A thromboprophylaxis dose of LMWH should be given by 3 -6 hours after caesarean section.	Yes	36 (21.2)	134 (78.8)	170 (100.0)
B15. Women with APLS (Antiphospholipid Antibody Syndrome) on warfarin should be commenced on aspirin upon confirmation of pregnancy.	Yes	28 (16.5)	142 (83.5)	170 (100.0)
B16. Post-partum mothers should be assessed after delivery according to risk factors and offered thromboprophylaxis.	Yes	4 (2.4)	166 (97.6)	170 (100.0)
B17. Massive life threatening especially pulmonary embolism must immediately treat with thrombolytic therapy.	Yes	2 (1.2)	168 (98.8)	170 (100.0)
B18. Renal impairment is the risk factor for increase bleeding and complication of Heparin.	Yes	57 (33.5)	133 (66.5)	170 (100.0)
B19. Therapeutic anticoagulation therapy should be continued during the pregnancy and for at least 6 weeks post-partum.	Yes	26(15.3)	144(84.7)	170 (100.0)
B20. Treatment with fondaparinux is not recommended in pregnancy as it can cross the placenta.	No	121 (71.2)	49 (28.8)	170 (100.0)
B21. In obese women it is recommended Heparin dosed by actual weight; otherwise, will increased risk of recurrent VTE.	Yes	13 (7.6)	157 (92.4)	170 (100.0)
B22. The risk of DVT is approximately twice as high after caesarean delivery than vagina birth.	Yes	12 (7.1)	158 (92.9)	170 (100.0)
B23. Heparin can be reversed by protamine sulfate; it will rapidly neutralize Heparin activity.	Yes	32 (18.8)	138 (81.2)	170 (100.0)
B24. Be aware of the potential effects of additional therapy (drug/ herbal/ supplement/ elective procedure) given to patient on anticoagulants.	Yes	14 (8.2)	156 (91.8)	170 (100.0)
B25. The risk of VTE is greatest in the first few months of starting Combine Oral Contraceptive Pills.	Yes	65 (38.2)	105 (61.8)	170 (100.0)
B26. Patients with cancer are at increased risk of developing VTE and risk of recurrent VTEs.	Yes	33 (19.4)	137 (80.6)	170 (100.0)

B27. Women in maintenance therapy of Heparin should be advised when she is in labor, she must stop the injection.	Yes	9 (5.3)	161 (94.7)	170 (100.0)
B28. Patients on injection Heparin should be dispensed with the correct dose, route and time of administration.	Yes	5 (2.9)	165 (97.1)	170 (100.0)
B29. If there is a severe allergic reaction to heparin or a heparin induced thrombocytopenia, Fondaparinux is an effective option.	Yes	22 (12.9)	12.9 (87.1)	170 (100.0)
B30. Patient education is imperative to ensure safe and effective use of warfarin therapy.	Yes	17 (10.0)	153 (90.0)	170 (100.0)

Referring to Table 2, question B3: around 50 of respondents (29.4%) have answered wrongly.

Meanwhile, in question B5: An elevation in D-Dimmers is a significant test for pulmonary embolism presentation, 29 of respondents (17.1%) have answered wrongly. Whereas, in question B6: Anti-thrombin deficiency is the most common inherited cause of DVT,45 of respondents (26.5%) answered wrongly. Question B9: Warfarin with INR monitor is not safe for all mothers with renal impairment,124 of respondents (72.9%) answered wrongly.

Subsequently, in question B10: 101 of respondents (59.4%) answered wrongly and in question B11: 48 of respondents (28.2%) answered wrongly. Besides, in question B13: Before giving Heparin therapy, blood samples of PT and APTT/INR (Prothrombin time) should take to establish a baseline, 37 of respondents (21.8%) answered wrongly. In question B14: 36 of respondents (21.2%) answered wrongly regarding prophylaxis dosage for LMWH after caesarean section.

Thus, in question B15: Women with APLS (Antiphospholipid Antibody Syndrome) on warfarin should be commenced on aspirin upon confirmation of pregnancy, 28 of respondents (16.5%) answered wrongly. Meanwhile, in question B18: Renal impairment is the risk factor for increase bleeding and complication of Heparin, 57 of respondents (33.5%) answered wrongly. In question B19: 26 of respondents (15.3%) answered wrongly on therapy of anticoagulation during pregnancy and post-partum.

Continuously, in question B20: 121 of respondents (71.2%) answered wrongly on fondaparinux in pregnancy. This is the highest percentage of wrongly answered by respondents among respondents. In question B23: Heparin can be reversed by protamine sulphate; it will rapidly neutralize Heparin activity, 32 of respondents (18.8%) answered wrongly.

Conversely, B25: 65 of respondents (38.2%) answered wrongly on risk of VTE in Combine Oral Contraceptive Pills, and B26: 33 of respondents (19.4%) answered wrongly regarding cancer patient and risk of developing VTE. Whereas, in question B29: If a severe allergic reaction to heparin or a heparin induced thrombocytopenia. Fondaparinux is an effective option, 22 of respondents (12.9%) answered wrongly and in the last question B30: Patient education is imperative to ensure safe and effective use of warfarin therapy, 17 of respondents (10.0%) answered wrongly.

Table 3 referred to level of Awareness among the nurses on VTE. The results showed 'good awareness' among 161(94.7%) nurses and awareness on the clinical symptoms presented by patients, prevention of DVT by early ambulation, and prolonged hospitalization and immobilization are the most significant factors that contribute to DVT. Whereas, 'average awareness' among 5(2.9%) nurses that are not aware on the complication of physiological changes are associated with pregnancy and 70% of the respondents had normal pregnancy.

Table 3: Frequency Table of Awareness on VTE Among Registered Nurses (n=170)

Questions	Answer	Wrongly Answer	Correctly Answer	Total
C1. All women should be assessed at the time of admission and treat according to risk factors.	Yes	1 (0.6)	169 (99.4)	170 (100.0)
C2. The clinical symptoms of women with DVT (Deep Vein Thrombosis) may present with pain in the lower abdomen or leg.	Yes	33 (19.4)	137 (80.6)	170 (100.0)
C3. Redness and discoloration of skin are signs and symptoms of DVT and chest pain and palpitation are the symptom of Pulmonary Embolism (PE).	Yes	13 (7.6)	157 (92.4)	170 (100.0)
C4. Dyspnoea is the most frequent symptom of Pulmonary Embolism.	Yes	9 (5.3)	161 (94.7)	170 (100.0)
C5. In clinically suspected DVT or Pulmonary Embolism, treatment with Heparin should be given until the diagnosis is excluded.	Yes	23 (13.5)	147 (86.5)	170 (100.0)

C6. Prolonged hospitalization and immobilization are the most acquired cause of DVT.	Yes	10 (5.9)	160 (94.1)	170 (100.0)
C7. Early ambulation and daily physical activity can prevent DVT of post caesarean section mother.	Yes	6 (3.5)	164 (96.5)	170 (100.0)
C8. Diagnosis of VTE during pregnancy can be complicated by physiological changes associated with pregnancy.	Yes	19 (11.2)	151 (88.8)	170 (100.0)
C9. Most symptom of Pulmonary Embolism incase of 70% in normal pregnancies, associated with swelling of the entire limb and back pain.	Yes	58 (34.1)	112 (65.9)	170 (100.0)
C10. VTE complicates between 1 in 500 and 1 in 2000 pregnancies and is more common post-partm than ante partum.	Yes	14 (8.2)	156 (91.8)	170 (100.0)

In Table 3 detail description on awareness's items. This table provides the correct answer and the percentage and frequency answered by respondents. Referring to question C2: The clinical symptoms of women with DVT (Deep Vein Thrombosis) may present with lower abdomen or leg pain, around 33 of respondents (19.4%) have answered wrongly; meanwhile in question C3: Redness and discoloration of skin are signs and symptoms of DVT and chest pain and palpitation is the symptom of Pulmonary Embolism (PE), around 13 of respondents (7.6%) have answered wrongly. In question C5: around 23 of respondents (13.5%) have answered wrongly regarding treatment with Heparin in suspected DVT or Pulmonary Embolism.

Subsequently, in question C8: on physiological changes associated with pregnancy, around 19 of respondents (11.2%) have answered wrongly. The last question in C9: Most symptom of Pulmonary Embolism occurs with 70% in normal pregnancies, associated with swelling of the entire limb and back pain, around 58 of respondents (34.1%) have answered wrongly.

Table 4: Crosstabulation between Sociodemographic and Knowledge

KNOWLEDGE					
Factor	**Group**	**1 Poor**	**2 Average**	**3 Good**	***P* value (Fisher's Exact Test)**
Age	20-29 years	0	2	38	0.2926
	30-39 years	0	6	69	
	40-49 years	0	0	35	
	50 and above	0	0	20	
	Certificate of Nursing	0	0	8	
Education Level	Diploma of Nursing	0	6	93	0.3532
	Advance Diploma/ Post Basic	0	1	54	
	Bachelor of Nursing	0	1	7	
Nurse Grade	U29	0	8	105	0.2224
	U32	0	0	50	
	U36	0	0	5	
	U42	0	0	2	
	≤ 5 years	0	4	36	
Years of Working	6-10 years	0	4	43	0.06076
	11-20 years	0	0	43	
	21-30 years	0	0	36	
	> 30 years	0	0	4	
Attend CNE	No	0	5	59	0.1544
	Yes	0	3	103	

**Significant p<0.05*

Table 4 refers to the relationship between socio-demographics and knowledge level. The finding shows no significant relationship between age, education level, nurse grade, experience, attend CNE with the knowledge level. Results showed that all respondents *p*-value greater than 0.05.

Table 5: Cross Tabulation between Sociodemographic and Awareness

AWARENESS					
Factor	**Group**	**1 Poor**	**2 Average**	**3 Good**	***P* value (Fisher's Exact Test)**
Age	20-29 years	0	2	38	0.6937
	30-39 years	2	3	70	
	40-49 years	1	0	34	
	50 and above	1	0	19	
Education Level	Certificate	1	0	7	0.3834
	Diploma of Nursing	1	4	94	
	Advance Diploma/ Post	2	1	52	
	Basic				
	Bachelor of Nursing	0	0	8	
Nurse Grade	U29	3	3	107	0.9002
	U32	1	2	47	
	U36	0	0	5	
	U42	0	0	2	
Years of Working	≤ 5 years	0	2	38	0.8136
	6-10 years	2	1	44	
	11-20 years	1	2	40	
	21-30 years	1	0	35	
	> 30 years	0	0	4	
Attend CNE	No	4	3	57	0.0134*
	Yes	0	2	104	

**Significant p<0.05*

The finding in Table 5 showed no significant relationship between age, education level, nurse grade and experience with the knowledge level. All have *p*-value greater than 0.05 except for those attending CNE. There is significant relationship between attending CNE and level of awareness. Respondents that attended CNE are more aware compared to those that do not attend CNE.

DISCUSSION

In this study, the results showed 'good knowledge' among 162 (95.3%) nurses regarding the management of VTE when dealing with patients. The survey started with the basic question regarding the screening for all kinds of risk associatantenatal and postnatal mothers refer to clinical practice guidelines, the recommendation dosage and monitoring of therapeutic anticoagulation therapy, risk of DVT, and patient subsequent management and follow-up appointment in the periphery clinics assessment score.

There was only 'average' level of knowledge among 8(4.7%) nurses who were still unsure regarding

management of VTE. This study was similar with Ma *et al.*, (2018) and Oh, Boo & Lee (2017) which revealed that nurses' knowledge levels about VTE prophylaxis were different among the different departments.

Training or continuous education can be the remedy for the improvement of the nurses in dealing with DVT. These results indicate that nurses should continuously receive high-level of training. This is supported by Boddi *et al.*, (2014), whereby after training, DVT reduced among patients. Based on our findings, competency in thromboprophylaxis might vary among the nurses in our setting.

Recommendations

In Malaysia, nurses are healthcare professionals and they play an important role in the healthcare sector. The eligibility criteria for working in Obstetric and Gynaecology all over Malaysia must have the specific course, like the Advanced Diploma in Midwifery programme as a profession in their career pathway. These nurses can identify and detect antenatal and postnatal mothers with the risk of VTE in details and suggest doctor's for further intervention.

As the first-line health care providers, nurse play important roles to identify the risks of VTE. In this case, the nurse educator is important, too. Their role is to educate the nurses in every department, schedule ward round, prepare teaching tools and provide examples of the checklist for VTE score to demonstrate the risk of VTE grade.

CONCLUSION

In this study, it was discovered that the level of knowledge and awareness among nurses in the government hospital were at good level. However, more studies should be conducted to compare patients in different hospitals. This will capture a clear picture regarding nurses' knowledge and awareness regarding VTE management. Subsequently, it could be used to develop a new standards or policy to ensure good practice among nurses on VTE management.

Conflict of Interests

The authors declare that they have no conflict of interests.

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REFERENCES

Boddi, M., Cecchi, A., Bonizzoli, M., Barbani, F., Franci, A., Anichini, V., Batacchi, S., Parodo, J., Gensini, G. F. & Peris, A. (2014). Follow-up after four-year quality improvement program to prevent inferior limb deep vein thrombosis in intensive care unit. *Thrombo Resp, 134*(3), 578-583. https://doi.org/10.1016/j.thromres.2014.06.011.

Clinical Practice Guidelines. (2013). Prevention and Treatment of Venous Thromboembolism, Ministry of Health Malaysia. https://www.moh.gov.my/moh/attachments/9005.pdf

Das, S., Sahoo, A. & Swain, R. (2014). Effectiveness of the Planned Teaching Program on Deep Vein Thrombosis among the Staff Nurses of selected hospital. *Journal of Nursing and Health Science, 3*(1), 48-51. https://doi.org/10.9790/1959-03134851

Ekwere, T.A., Ino-Ekanem, B.M. & Ekanem, A. (2015). Venous thromboembolism: awareness and practice of thromboprophylaxis among physicians in a tertiary-care hospital. *International Journal of Medicine and Biomedical Research, 4*(1), 14-20. https://doi.org/10.14194/ijmbr.4.1.3

Lee, J.A., Grochow, D., Drake, d., Johnson, L., Reed, P. & Servellen, G. (2014).Evaluation of hospital nurses' perceived knowledge and practices of venous thromboembolism assessment and prevention. *Journal of Vascular Nursing, 32*(1), 18-24. https://doi.org/10.1016/j.jvn.2013.06.001

Ma, Y.F., Xu, Y., Chen, Y.P., Wang, X.J., Deng, H.B., He, Y. & Wu, X.J. (2018). Nurses' objective knowledge regarding venous thromboembolism prophylaxis. *Medicine, 97*(14), e0338. https://doi.org/10.1097/MD.0000000000010338

Ministry of Health, Malaysia. (2013). VTE and Maternal death. Maternal Health Sector Family Health Development Division. https://hoshas.moh.gov.my/hoshasv4/attachments/article/76/VTE2017%20VTE%20and%20Maternal%20Mortality_DrMajdah.pdf

Oh, H., Boo, S. & Lee J.A. (2017). Clinical nurses' knowledge and practice of venous thromboembolism risk assessment and prevention in South Korea: a cross-sectional survey. *Journal of Clinical Nursing, 26*(3), 427-435. https://doi.org/10.1111/jocn.13424

Sarkar, P. & Ray, M. (2018). An Experimental Study on The Effectiveness of a Structured Teaching Programme Among the Clinical Nurses' Perceived Knowledge and Practice in Deep Vein Thrombosis. *International Journal of Scientific Research, 7*(6), 32-36. https://doi.org/10.36106/ijsr

Simcox, L. E., Ormesher, L., Tower, C., & Greer, I. A. (2015). Pulmonary thrombo-embolism in pregnancy: diagnosis and management. *Breathe, 11*(4), 282-289. https://doi.org/10.1183/20734735.008815

Tang, X., Sun, B., Yang, Y.H. & Tong, Z.H. (2015). A Survey of the Knowledge of Venous Thromboembolism Prophylaxis among the Medical Staff of Intensive Care Units in North China, *PLoS One, 10*(9), e0139162. https://doi.org/10.1371/journal.pone.0139162

Zobeiri, M. & Najafi, F. (2011). Prophylaxis for deep venous thrombosis: Knowledge and practice of surgeons. *Pakistan Journal of Medical Sciences, 27*(1), 16-20.