Adult Cardiology

Practices and Attitudes of Physicians on Deep Venous Thrombosis Prophylaxis Among Critically Ill Patients Admitted at The Medical and Neurologic Intensive Care Units

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Background --- Venous thromboembolism is a complication that is commonly seen among critically ill patients admitted at both surgical and medical ICUs. Prophylaxis for deep venous thrombosis (DVT), early recognition and appropriate treatment can save many lives. Recommendations for use of prophylaxis are available. However, there are different practices among different subspecialties in its use and applications. In general, physicians have different approaches to DVT prophylaxis, and usually this is influenced by the subsets of patients seen and encountered in the practice as well as the availability of the medications used for prophylaxis. The use of standard criteria for stratification of patients for VTE prophylaxis use is sometimes under-utilized. Many patients who might benefit from the routine use of these medications are sometimes not properly identified. Thus, this study was conducted to assess the practices and attitudes of physicians on venous thromboembolism(VTE) among critically ill patients admitted at the medical and neurologic ICU.

Methods --- This was a multi-centered cohort study involving critically ill patients, 18 years old and above, admitted for a minimum of 4 days at the medical and neurology ICU of PHC, MMC and PGH. Patients who were included were evaluated for their demographic characteristics, use of DVT prophylaxis, type, doses and timing of medication used, indications and/or use of mechanical prophylaxis, and techniques for screening and surveillance of DVT and/or pulmonary embolism. Chart review was done and admitting data were collated to answer a standard DVT "risk assessment questionnaire. Interviewer-administered questionnaires for physicians who managed the patients, regarding their attitudes and practices were also used (including a risk-grading sheet to double check their knowledge of the factors that contribute to DVT). Patients enrolled were followed up for an addition of at least 1 more week (or until discharge from ICU) by the investigators to assess clinically for development of DVT/PE and if necessary to recommend either d-dimer, V/Q Scan or venous duplex ultrasound of the lower extremities.

Results --- A total of 106 consecutive patients who were either admitted in the medical or neurologic ICU for at least 4 were studied and followed up for 4 weeks. A total of 27 physician's questionnaire was also distributed to investigate their practices and attitudes. Only 57% of patients received VTE prophylaxis. Out of the 57% who received VTE prophylaxis only 62% (37/60) were deemed appropriate for risk stratification. Around 2.8% developed proven VTE (pulmonary embolism or deep venous thrombosis). Well's score was found to be associated with development of VTE. Seventy four percent believed that the primary indication for using DVT prophylaxis was history of previous DVT/PE. Seventy one percent used prophylaxis only selectively due to fear of bleeding and cost despite seventy percent reporting seeing morbity due to VTE.

Conclusion --- The use of VTE prophylaxis in the said institutions is insufficient and not matched to the level of risk. There is a need to establish a common standardized approach to ensure that patients will receive adequate prophylaxis among medical and neurologic ICU patients. ***Phil Heart Center J 2007; 13(2):113-118.***

Key Words: Venous thromboembolism ■ Deep venous thrombosis prophylaxis ■ critically-ill, intensive care patients ■ attitude and practice

Venous thromboembolism is a complication that is commonly seen among critically ill patients admitted at both surgical and medical ICUs. Thrombosis either develops spontaneously (idiopathic or with underlying abnormality in coagulopathy) or is associated with conditions like surgery, trauma or prolonged bed rest. VTE and its sequelae of pulmonary embolism and post-thrombotic syndrome are not only troublesome and morbid but in cases of massive PE can be fatal.[1-2] Therefore, prophylaxis for deep venous thrombosis (DVT), early recognition and appropriate treatment can save many lives. Recommendations for use of

prophylaxis are available. However, there are different practices among different subspecialties in its use and applications.

In general, physicians have different approaches to DVT prophylaxis, and usually this is influenced by the subsets of patients seen and encountered in the practice as well as the availability of the medications used for prophylaxis. The use of standard criteria for stratification of patients for VTE prophylaxis use is under-utilized. Many patients who might benefit from the routine use of these medications are sometimes not properly identified. In Asia, there is paucity of evidence on the actual incidence of this preventable cause of death. But current studies show that DVT occurs as frequently among Asians as do among Caucasians and that use of DVT prophylaxis should be no different form that in Western patients.[3]

This study was conducted to determine the attitudes and practices of physician on VTE prophylaxis among critically ill medical patients. Other aims of the study included the determination of the rate of venous thromboembolism as well as the association of current practices on DVT prophylaxis with the occurrence of venous thromboembolism.

Methods

A multicenter cohort study involving critically ill patients, 18 years old and above admitted for a minimum of 4 days at the medical and neurology ICU of PHC, MMC and PGH was conducted. Forty-eight hours of immobilty, is generally associated with increased the risk of DVT and we allowed two more days (a total of 4 days) minimum to be able to observe without bias the actual practices in the ICU with regards to DVT prophylaxis. Patient selection and admission to the study were done every first day of the week for 4 consecutive weeks. Patient's data sheet were accomplished. Patients who were included were evaluated for their demographic characteristics. The admitting diagnosis and the working diagnosis on admission were noted. Data pertaining to use of DVT prohylaxis, type of medication used, their doses and timing , indications and /or use of mechanical prophylaxis , and techniques for screening and surveillance of DVT and/or pulmonary embolism were noted. Well's scoring was also performed by the investigators at bedside. Interviewer-administered questionnaires for physicians, who managed the patients, regarding their attitudes and practices were used (including a risk-grading sheet to double check their knowledge of the factors that contribute to DVT). For those identified to be at moderate or high risk for venous thromboembolism (DVT and/ or PE), the fellows or residents-in-charge were contacted and advised accordingly.

Patients enrolled were followed up for an addition of at least 1 more week (or until discharge from ICU) by the investigators to assess clinically for development of DVT/PE and if necessary to recommend either D-dimer, V/Q Scan or venous duplex ultrasound of the lower extremities.

Venous thromboembolism included both deep venous thrombosis and pulmonary embolism. Suspected deep venous thrombosis included unilateral leg swelling developing after prolonged bedrest and known associated risk for DVT. It is proven DVT if venous duplex ultrasound shows incompressible or partially compressible deep veins of lower extremities. Suspected pulmonary embolism included cases wherein no primary lung problem can explain sudden deterioration in patients respiration (which may require mechanical ventilation) while admitted in the ICU. Proven pulmonary embolism included those with positive high resolution lung CT scan and/or V/Q scan.

Statistical analysis using percentages, mean, standard deviation, 2-tailed Fischers exact test and chi-square or Kruskal-Wallis tests were used accordingly.

Results

The authors were able to collect data from 106 patients admitted in 3 different hospitals (PHC=40; PGH=41; MMC=35). Only patients form medical ICU and neurologic ICU, or its equivalent in the said hospitals, were included in the study. They were subsequently followed up for at least 1 more week or until discharge from ICU or death while in ICU. It was also noted whether the patient developed venous thromboembolism during the study period (whether suspected alone or proven

The mean age is 60.6 years with standard deviation of 18 (22-98 range). The mean BMI is 23.45 with standard deviation of 3.456. Fifty four percent of the subjects were male. Nine patients had active bleeding on admission. Fourteen percent (15/106) had COPD, 15% had CHF (16/106), 15% had ACS. Thirty eight percent (40) had acute lung disease, 37% (39) had cerebrovascular accident (18 infarct, 21 hemorrhage). Sixty one percent (65) had hypertension, 31.1% (33) had diabetes. Thirty five (37) were smokers. Twenty two percent (23) were on mechanical ventilator. Four patients had active cancer, eight had septicemia from other causes (UTI, gynecologic, meningitis, septic arthritis). The average length of hospital stay was 15 days. (Table 1)

Eight patients developed either PE or DVT (suspected or proven). Two patients developed PE during the course of admission (1 admitted for gynecologic septicemia, another with congestive heart failure) proven by lung perfusion scan. One patient developed DVT proven by duplex ultrasound of the lower extremities. The remaining five patients [1 with suspected DVT (symptomatic); 4 with suspected PE based on clinical grounds) were unable to be worked up but otherwise treated as DVT or PE. Around 2.8% (3/106) of the total subjects developed proven DVT or PE.

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Seven out of the eight patients with either suspected or proven PE or DVT had Well's score of more than or equal to two (more than or equal to moderate risk for DVT). The mean Well's score is 1.747 with a standard deviation of 0.719.

All the demographic factors (including hypertension, diabetes, BMI, age, gender, smoking history) specific risk factors (such as acute coronary syndrome, COPD, acute lung disease, congestive heart failure) and presence or absence of DVT prophylaxis were not correlated with either development of PE or DVT. Only the Well's score was significantly correlated with development of positive outcome (either DVT or PE) with a Kruskasl-Wallis H of 4.592 and p value of 0.032. Eleven percent (12 patients) fall under high risk group (with scores of equal to or more than 3 in Well's Scoring). Four patients expired due to their underlying medical condition during the study period.

Out of the 106 patients who satisfied the inclusion criteria, only 57% (60/106) were given DVT prophylaxis. (Figure 1).
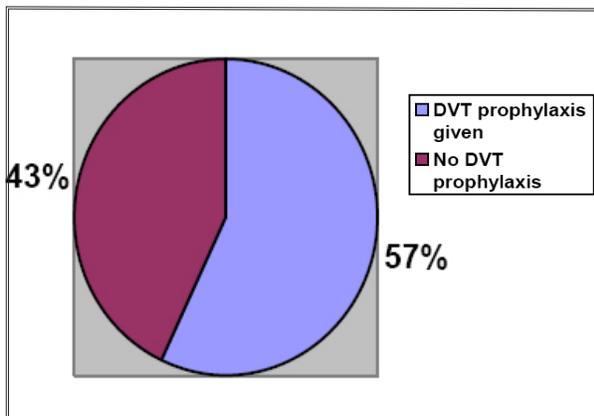

Figure 1. Frequency of Use of DVT Prophylaxis

Of those who had DVT prophylaxis, 38% (21/60) were on LMWH, 47% (29/60) were on mechanical prophylaxis [bandages (8), TED stockings (20), graduated compression stockings (1)], and 6% were unspecified (4/60). Nine out of 60 were on combination of either stockings, LMWH and/or rehabilitation.
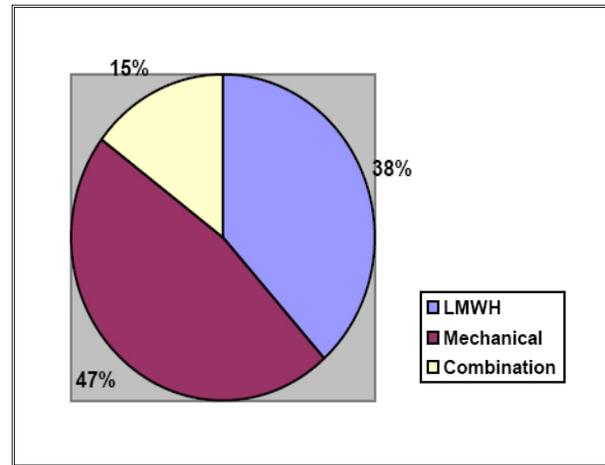

Figure 2. Distribution of DVT Prophylaxis Given (LMWH-low molecular weight heparin, mechanical prophylaxis including graduated compression stockings and TED stockings, and combination of different prophylaxis)

Table 1. Demographic Factors and Associated Illnesses with VTE

Factor	Positive for VTE N=8	Negative for VTE N=96	P Value
Age (mean/SD)	55.25/ 21.3	61/17.8	0.386
BMI (mean/SD)	24.1/ 2.5	23.4/ 3.55	0.68
Male	3	54	0.462
Female	5	42	
Hypertension	3	103	0.218
Diabetes	4	29	0.25
Smoker	3	34	1.0
DVT prophylaxis	7	53	0.13
COPD	1	14	1.0
CHF	2	13	0.63
Acute lung disease	5	3	0.15

*All not significant

Fifteen percent (16/106) were already on either UFH (unfractionated heparin) or LMWH for primary treatment of ACS or cardioembolic disease. Of those on LMWH for VTE (DVT and PE) prophylaxis, 81% received enoxaparin 40 mg sq OD. Nine percent each received 60 mg and 20 mg SQ enoxaparin.

Out of the 57% who received VTE prophylaxis, only 62% (37/60) were deemed appropriate for risk stratification. Appropriate means that the recommended ACCP prophylaxis corresponding to risk stratification was followed accordingly. For moderate risk group of patients totalling 96, only 40 received prophylaxis and only 35 were appropriate. And as for the high risk group only 2 out of 10 received appropriate prophylaxis.

Only 12% (7/60) had regular monitoring for complications of prophylaxis (CBC with platelet count, PT and PTT).

Two out of 29 patients on LMWH (or 7%) had significant bleeding requiring transfusion. One was diagnosed to have heparin-induced thrombocytopenia (defined as a 50% drop in platelet count from baseline occurring between days 4-12 after being exposed to heparin). One had hemorrhagic transformation of cerebral infarction. All four stopped heparin and were shifted on anti-embolic stockings alone or graduated compression stockings.

Out of the 27 fellows from PHC who answered the questionnaire, 78% believed that the incidence of DVT in the Philippines is as common as in the West. Seventy four percent believed that the primary indication for using DVT prophylaxis was history of previous DVT/PE. Seventy one percent use DVT prophylaxis selectively as opposed to routine. (Figure 3).
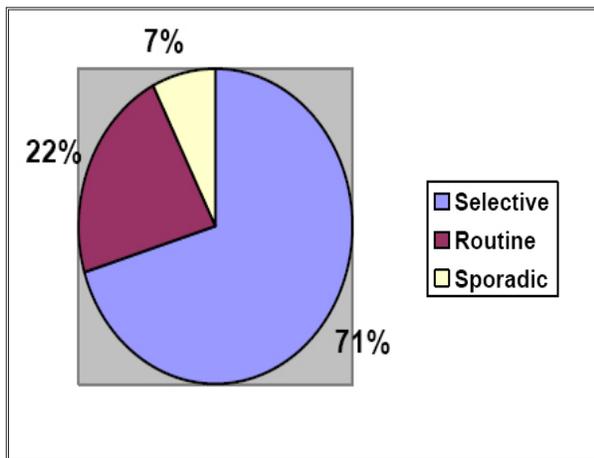

Figure 3. Distribution of Fellow's response Regarding use of DVT Prophylaxis

Among those who used it selectively, forty percent do so due to risk of bleeding and the same percentage find it expensive. (Figure 4).
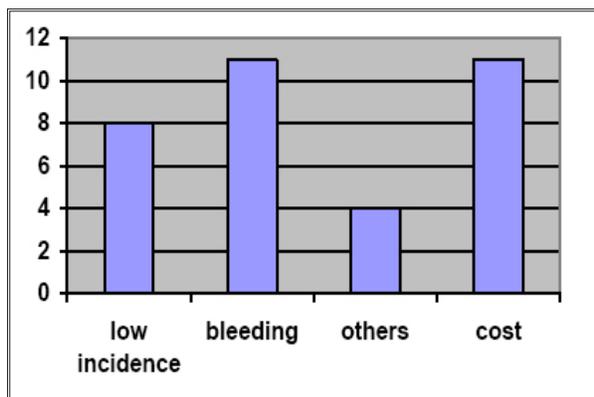

Figure 4. Reasons for Sporadic or Selective Use of DVT Prophylaxis

Almost all use LMWH as method of prophylaxis while 70% also use compression stockings and 7% used pneumatic compression. (Figure 5).
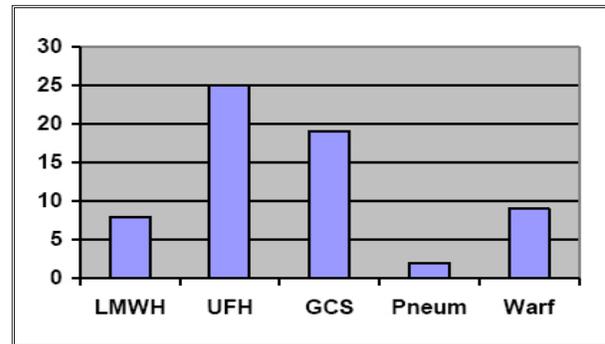

Figure 5. Type of DVT Prophylaxis Used (GCS- graduated compression stockins; pneum- intermittent pneumatic compression; warf- warfarin)

Only 44 % admitted using a protocol for DVT prophylaxis and this was mostly true for pulmonology fellows compared to cardiology fellows. Sixty percent have seen mortality and 70% reported seeing morbidity due to development of DVT and PE, 75% of which were not on any thromboprophylaxis. Most (70%) learned about DVT prophylaxis during residency and fellowship.

Discussion

It has been established that venous thromboembolism (VTE) remains a major cause of morbidity and mortality among hospitalized patients. Even in the industrialized countries where venous thromboprophylaxis in surgical patients is widely practised, this approach has not been broadly implemented in hospitalized medical patients. What apparently limits the accurate assessment of overall burden of VTE in medical patients lies in their greater heterogeneity. In the absence of a structured and intutional protocol with convenient risk-stratification, identifying individual medical patients at high risk for VTE may seem daunting to practitioners.[4]

Considering that admission to an intensive care unit is already associated with higher risk of VTE , the risk being at least moderate due to multiplicity of risk factors (including expected prolonged bed rest) the use of VTE prophylaxis (heparin and mechanical prophylaxis) remains low in the three institutions studied which in total is around 57%. And only 62% of which followed the appropriate recommendation for VTE prophylaxis. Compared to the France and Canada with a usage of around 63.9% of LMWH or UFH for VTE prophylaxis, usage among the participating institutions showed a significantly lower rate (20% of patients in both MICU and NICU).[5-6] Also mechanical prophylaxis remains low (27%) even with the absence of attendant risk of bleeding. In PGH in

particular, elastic bandages were used more frequently as an alternative to more expensive TED stockings (which is almost excusively the compression therapy of choice in mechanical prophylaxis compared to more effective graduated compression stockings). Heparin usage and VTE prophylaxis in general may be low due to several factors including lack of awareness among physicians of necessity of giving thromboprophylaxis, lack of institutional guidelines to be implemented, lack of confidence in prescribing prophylaxis to MICU and NICU patients, fear of complications like bleeding, cost of prophylaxis and belief of low prevalence of VTE.[7-8]

The absence of association of presence or absence of DVT prophylaxis with the reduction or increase of VTE (PE and DVT, proven or suspected) is probably due to the late administration of prophylaxis among the patients who did receive DVT/VTE prophylaxis (average of 6 days post ICU admission). This provides an important information to us since VTE prophylaxis should be instituted early to provide necessary protection. The rather higher rate of bleeding complications among MICU and NICU compared to other subset of patients may be partly explained again by the multiplicity of co-existing illnesses that may increase the risk for bleeding (e.i. renal failure, septicemia, etc.) and also the low rates of surveillance for complications of DVT prophylaxis among the patients.[9] The same is true for finding no association between the known demographic factors like age, BMI and associated illness like congestive heart failure, acute lung disease, COPD and development of PE or DVT.[10] The sample size is also limited. There is also underutilisation of established non invasive reliable methods for diagnosis of DVT and PE, like duplex ultrasound of the lower extremities. However a Well's score of two or more (which is moderate to more than moderate risk for DVT) was significantly correlated with development of PE and DVT.

The limitation of the of this study is inherent in the study group (the heterogeneity of subjects). The number of participants was also rather limited and they were only followed up to a maximum of 4 weeks. Another limita tion is inability to diagnose the asymptomatic cases of DVT and PE (which to some authors may not be clinically relevant especially the distal DVT) because of lack of screening duplex ultrasound of lower extremities which was used in the MEDENOX, PREVENT and ARTEMIS studies. However, the clinical relevance of asymptomatic VTE is still not well-established.

Conclusion

Despite the growing body of evidence that thrombophylaxis among medical and neurologic ICU patients being safe and effective, there is a general gap between knowledge and actual practice. In our country specifically in the institutions studied, there is a low usage of DVT prophylaxis among both neurologic and medical ICU patients. In fact even in United States of America, hospitalized medical patients seem to be the last frontier in DVT prophylaxis owing to the fact of general indifference to its perceived effectiveness, risk of bleeding and cost.[11] But due to the larger population of medical patients compared to for example orthopedic or surgical patients, an equivalent larger benefit may be achieved. As long as pulmonary embolism still remains the most common preventable cause of death in hospitalized patients, the coming years may bring about wider and more appropriate use of anticoagulants to prevent potentially fatal complications of VTE. The rather dismal use of DVT prophylaxis in medical and neurologic ICUs is no different in our country wherein cost issues may be more important. Even in those who receive thromboprophylaxis, there is a lack knowledge in the appropriate type and intensity of prophylaxis (e.g. for very high risk both LMWH and mechanical prophylaxis is appropriate), surveillance of complications of VTE and complications of prophylaxis itself. The apparent late initiation of prophylaxis among these patients appears to be self-defeating and might be heavily leaning on waiting for symptoms to develop before starting thrombophrophylaxis. Which brings us to the pitfall of using only Well's criteria for risk stratification (many of the scores being garnered from symptomatic DVT). In fact it may be more helpful to use the 'stepwise approach to thromboprophylaxis for acutely ill medical patients' for risk assessment on admission to the hospital particularly the intensive care units similar to the protocol use by MEDENOX (prophylaxis in MEDical patients with ENOXaparin study This type of stepwise approach is easy to follow and can be done on admission of any acutely ill medical patient whether they are admitted in the ICU or in the wards. This eliminates the burden and difficulty of identifying risk of individual hospitalized medical patients. This must be coupled with strong and steady implementation of an instutional based protocol to prevent VTE.[12-13]

For future studies, it is recommended that weekly DVT screening using duplex ultrasound be employed for all patients included in the study to detect also asymptomatic DVT. A larger sample size is also ideal. Other risk stratification modalities or protocols can also be used besides Well's scoring. Since neurologic patients may have inherent differences from medical ICU patients with regards to risk of VTE, it may also be intersting to compare the practices between the two groups. Another area of research is to look into factors that will improve implementation of VTE protocols (e.g. after lectures or round table discussions, checklist of risk factors in every chart, etc).

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