

## Evaluation of the use of prophylaxis for deep venous thrombosis in a teaching hospital

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### RESUMO

**Contexto:** A trombose venosa profunda (TVP) é uma doença freqüente e grave. A profilaxia é o melhor meio para reduzir a sua incidência, diminuindo a morbimortalidade gerada por suas complicações. Na relação custo x efetividade, é melhor manter uma rotina profilática do que tratar a doença já instalada.

**Objetivo:** Verificar se a profilaxia da TVP está sendo utilizada de maneira adequada e rotineira no Hospital Escola Doutor José Carneiro (HEJC), de Maceió (AL).

**Métodos:** Foi realizado um estudo transversal descritivo no HEJC durante o período de 6 meses. A amostra foi de 298 pacientes, de diferentes especialidades. Os dados foram coletados nos prontuários, divididos em clínicos (68,5%) e cirúrgicos (31,5%). Analisou-se, em cada paciente, como se procedeu a utilização da profilaxia para a TVP. Foram pesquisados fatores clínicos, medicamentosos e cirúrgicos para todos os pacientes e, com base nesses dados, foi realizada estratificação do risco conforme a classificação recomendada pela Sociedade Brasileira de Angiologia e Cirurgia Vascular (SBACV). O estudo estatístico foi realizado através do software SPSS, utilizando os testes qui-quadrado e de correção bivariada, considerando o valor de  $p < 0,05$ .

**Resultados:** Dos 298 pacientes analisados, 204 eram da clínica médica, onde 28,9% eram de baixo risco, 60,3% médio risco e 10,8% alto risco para TVP; e 94 pacientes eram da clínica cirúrgica, onde 43,6% apresentaram baixo risco, 52,1% médio risco e 4,3% alto risco. Apenas 23% dos pacientes do grupo clínico e 2,1% para o grupo cirúrgico receberam a profilaxia de forma adequada.

Conclusão: Apesar da eficácia da profilaxia para a TVP já ter sido comprovada e difundida, em nosso meio ainda não atinge os níveis desejados de utilização.

Palavras-chave: Prevenção e controle, trombose venosa, avaliação.

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## ABSTRACT

**Background:** Deep venous thrombosis (DVT) is a frequent and severe disease. Prophylaxis is the best means to reduce its incidence, lowering morbidity and mortality rates caused by its complications. In a cost-effectiveness ratio, it is better to maintain a prophylactic routine than to treat an established disease.

**Objective:** To verify whether DVT prophylaxis is being properly and routinely used at Hospital Escola Doutor José Carneiro (HEJC), in Maceió, Brazil.

**Methods:** A descriptive, cross-sectional study at HEJC was carried out for a 6-month period. The sample was composed of 298 patients within different specialties. Data were collected from medical records, and divided into clinical (68.5%) and surgical (31.5%). How DVT prophylaxis was performed was analyzed for each patient. Clinical, pharmacological and surgical factors were investigated for all patients. Based on these data, risk stratification was performed in accordance with the classification recommended by Sociedade Brasileira de Angiologia e Cirurgia Vascular. Statistical analysis was performed using software SPSS and the qui-square and bivariate correction tests, considering p value < 0.05.

**Results:** Of the 298 patients analyzed, 204 belonged to medical clinic, in which 28.9% were low risk, 60.3% average risk and 10.8% high risk for DVT; and 94 patients belonged to surgical clinic, in which 43.6% were low risk, 52.1% average risk and 4.3% high risk. Only 23% of patients in the clinical group and 2.1% in the surgical group were given adequate prophylaxis.

**Conclusion:** Despite the efficiency of prophylaxis for DVT having been confirmed, it does not reach satisfactory levels in our country.

**Keywords:** Prevention and control, venous thrombosis, evaluation.

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## Introduction

Development of venous thromboembolism is dependent on alteration in one or more factors of the triad described by Virchow in 1856, which considers changes in venous stasis, hypercoagulable state, and vessel wall injury as responsible for the thrombotic process.<sup>1</sup> After 150 years, that statement remains true, but the knowledge of the relative role of each of these factors increased the understanding of the thrombotic phenomenon, allowing the diagnosis and identification of individuals with higher risk of developing thrombosis, thus aiding in the more rational management of such patients.<sup>2</sup>

Deep venous thrombosis (DVT) is a frequent disease, especially as a complication of other surgical and clinical affections. However, they may also occur spontaneously in apparently healthy individuals.<sup>3</sup>

DVT has pulmonary embolism (PE) as its most severe immediate consequence. In its acute phase, it is associated with probability of severe complications, which are often fatal.<sup>4</sup> In its chronic phase,

it can be responsible for several cases of physical disability and huge socioeconomic expenses, with the development of severe chronic venous insufficiency, resulting in the so-called post-thrombotic syndrome.<sup>4,5</sup> Venous thromboembolism is also described as the most common cause of preventable hospital mortality.<sup>6,7</sup>

DVT prophylaxis is essential, since this disease is the main cause of PE,<sup>8</sup> which in turn can be the first manifestation of DVT and is usually fatal in 0.2% of hospitalized patients.<sup>9</sup>

DVT is the third most frequent cardiovascular disease in the USA. Anderson et al. estimated around 170,000 new cases of DVT or PE a year, and 9,000 relapses over the same period, resulting in at least 13,000 deaths every year.<sup>10</sup>

In our country, Maffei's study reports an estimate of 0.6 cases per 1,000 inhabitants/year, based on DVT cases confirmed by phlebography or duplex scan.<sup>11</sup> Fowkes et al., in a review study, using a meta-analysis in 2003, estimated that worldwide incidence of DVT is 0.5 cases per 1,000 inhabitants/year.<sup>12</sup>

The European Consensus for prevention of thromboembolic disease estimates annual incidence of 160 DVT cases and 60 cases of fatal PE for each group of 100,000 inhabitants in Western countries.<sup>13</sup>

In general surgery, global incidence of DVT assessed by iodine 125-labeled fibrinogen is 25% in patients without prophylaxis.<sup>14</sup>

Clinical suspicion of DVT confirmed by complementary phlebography examination was 40%, reported by Richards.<sup>15</sup> Sandler et al.<sup>16</sup> found 58% and Rollo et al.<sup>17</sup> performed a phlebographic study in 424 patients with suspicion of DVT and found 68.6% of patients with confirmed diagnosis of DVT.

Over the past 2 decades, DVT prophylaxis has been accepted as a well established and efficacious strategy. Studies by American and European groups defined detailed recommendations, which should be used in all classes of hospitalized patients.<sup>9,18</sup> Despite DVT prevention protocols being available for all health professionals, many do not use them routinely.<sup>19,20</sup>

Our study aims at verifying whether DVT prophylaxis is being routinely and adequately used at a teaching hospital, working with the observational hypothesis that it is not performed according to current guidelines.

## Methods

A cross-sectional, prospective and descriptive study was performed, with the aim of evaluating DVT prophylaxis at HEJC from January to June 2006.

The sample, defined by convenience, included 298 patients from different medical specialties hospitalized at HEJC. Data collection was performed through analysis of medical records of hospitalized patients, who were divided into two groups: clinical and surgical. Surgical patient was considered that who had been submitted to any type of surgical procedure in current hospitalization. Exclusion criteria were patients younger than 18 years, Indians (since they are part of the special population that needs previous legal authorization to be included in research studies, according to resolution 196 of bioethics, and during the research period their number was not

relevant) and outpatients.

Each patient was assessed and stratified according to DVT risk. Clinical, surgical and pharmacological factors were analyzed, following a previously defined protocol. Table 1 has the data that were part of the study protocol, which were searched in hospital records. Once the protocol was filled in, patients were grouped in low, moderate and high risk, according to the Norms of Clinical Guidance of the Sociedade Brasileira de Cirurgia e Angiologia Vascular (SBACV)<sup>21</sup> (Tables 2 and 3).

**Table 1 - Risk factors for deep venous thrombosis**

	Clinical factors	Drugs	Surgical factors
Age	POAD	Oral contraceptive	Surgical procedure
Gender	Heart failure	Hormone replacement	Surgery time
Days hospitalized	Renal failure	Corticosteroids	Type of anesthesia
	Liver failure		
	Stroke		
	Diabetes		
	Nephrotic syndrome		
	Acute myocardial infarction		
	Arrhythmias		
	Inflammatory colon disease		
	Obesity		
	Immobilization		
	Autoimmune disease		
	Varicose veins		
	Dehydration		
	Previous DVT		
	Neoplasm		
	Infection		

POAD = pulmonary occlusive arterial disease.  
Source: Caiafa.<sup>21</sup>

**Table 2 - Risk categories for thromboembolic disease in clinical patients**

Low risk	Moderate risk	High risk
Any patient	Patients > 65 years, affected by clinical diseases with no other risk factors	Any disease associated with previous DVT or PE Any disease associated with thrombophilia Myocardial infarction Diseases associated with other risk factors for DVT Stroke Bone marrow lesion Patients at ICU Risk categories for thromboembolic disease in clinical patients

Source: Caiafa.<sup>21</sup>

Table 3 - Risk categories for thromboembolic disease in surgical patients

Low risk	Moderate risk	High risk
Surgeries in patients < 40 years old, with no other risk factors Minor surgeries (< 30 min and without need of prolonged rest) in patients < 40 years with no other risk apart from age	Major surgery (general, urologic or gynecologic) in patients aged 40-60 years with no additional risk factors Surgery in patients < 40 years taking estrogen	General surgery in patients > 60 years old General surgery in patients aged 40-60 years with additional risk factors Major surgery in patients with history of previous DVT or PE or thrombophilia Major amputations Major orthopedic surgeries Major surgeries in patients with malignant neoplasms Major surgeries in patients with other hypercoagulability states Multiple traumas with fracture of the pelvis, hip or lower limbs

Source: Caiafa.<sup>21</sup>

Correct use of prophylaxis for DVT was evaluated according to SBACV recommendations.<sup>21</sup> For low-risk patients recommendation is movement in bed and motor therapy (physical therapy); for these patients, pharmacological prophylaxis is not recommended. For patients at moderate risk for DVT, use of unfractionated heparin (UFH) subcutaneously (SC) at a dose of 5,000 IU twice a day is indicated; another option would be administration of low molecular weight heparin (LMWH), SC, at the lowest prophylactic dose recommended by the manufacturer, once a day. For patients at high risk for DVT, use of UFH, SC at a dose of 5,000 IU, three times a day is suggested; an alternative would be LMWH, SC, at the highest prophylactic dose recommended by the manufacturer. For all groups adequate motor therapy should be combined at each risk, and reassessments should be performed daily as to presence of venous thrombosis.<sup>21</sup>

Physical prophylactic methods consist of kinesiotherapy for the lower limbs;<sup>22</sup> graded compression elastic stockings;<sup>23</sup> intermittent pneumatic compression;<sup>24</sup> and walking. Together, those techniques work to reduce probability of DVT incidence. Motor physical therapy is recommended for all DVT risks, working as adjuvant to the pharmacological therapy or in cases of contraindication for use of anticoagulating agents.

The statistical study was performed using the software SPSS version 12.0, in which chi-square and bivariate correction tests were used, considering p value < 0.05.

## Results

A total of 298 patients was analyzed, 161 (54%) men and 137 (46%) women. Patients' mean age was 52.6 years. Of the total, 204 (68.5%) were clinical patients and 94 (31.5%) were surgical patients. According to risk stratification, 100 (33.5%) were classified as low risk, 172 (57.7%) as moderate risk and 26 (8.7%) as high risk for DVT. Of all patients, 49 (16.4%) received prophylaxis and 249 (83.5%) did not (Table 4).

**Table 4 - Frequency of use and adequacy of prophylaxis in clinical and surgical patients according to groups**

Group, n (%)	With prophylaxis		Without prophylaxis		Adequate prophylaxis		Partially adequate prophylaxis		Inadequate prophylaxis	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Medical clinic, 204 (68.5)	47	23.0	157	77.0	14	6.9	33	16.2	157	77.0
Surgical clinic, 94 (31.5)	2	2.1	92	97.9	2	2.1	0	0.00	92	97.9

Most patients were clinical (204-68.5%); of these, only 47 patients (23%) were given prophylaxis for DVT and, of these, only 14 patients (29.7%) were given adequate prophylaxis. It was more frequently used in patients at moderate risk. In patients of the surgical group (94-31.5%), only two (2.1%) were given adequate prophylaxis for DVT, one at moderate risk and another at high risk (Table 5).

**Table 5 - Frequency of patients, with and without prophylaxis for DVT and adequacy according to risk group**

Risk, n (%)	With prophylaxis		Without prophylaxis		Adequate prophylaxis		Partially adequate prophylaxis		Inadequate prophylaxis	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
<b>Medical clinic</b>										
Low, 59 (28.9)	0	0.0	59	100.0	0	0.0	0	0.0	59	100.0
Moderate, 123 (60.3)	35	28.5	88	71.5	7	5.7	28	22.8	88	71.5
High, 22 (10.8)	12	54.5	10	45.5	7	31.8	5	22.7	10	45.5
<b>Surgical clinic</b>										
Low, 41 (43.6)	1	2.4	40	97.6	1	2.4	0	0.0	40	97.6
Moderate, 49 (52.1)	1	2.0	48	98.0	1	2.0	0	0.0	48	98.0
High, 4 (4.3)	0	0.0	4	100.00	0	0.00	0	0.0	4	100.00

Of 198 clinical and surgical patients who had indication of pharmacological and physical prophylaxis, cases of moderate and high risk, only 48 (24.2%) were given combined therapy. Of these, 36 (18.1%) were moderate risk and 12 (6%) were high risk.

Correlation risk and adequate prophylaxis in the clinical group was 57% ( $r = 0.57$ ;  $p < 0.01$ ); however, in the surgical group there was no significant correlation, possibly due to the fact that there were only two cases of adequate prophylaxis.

Figure 1 shows frequency of use of prophylaxis for DVT in all patients in the clinical and surgical groups. Comparison of prophylaxis rate used in practice by clinicians and surgeons, in patients indicated to receive it, showed that clinicians prescribe prophylaxis for their patients more frequently than surgeons.

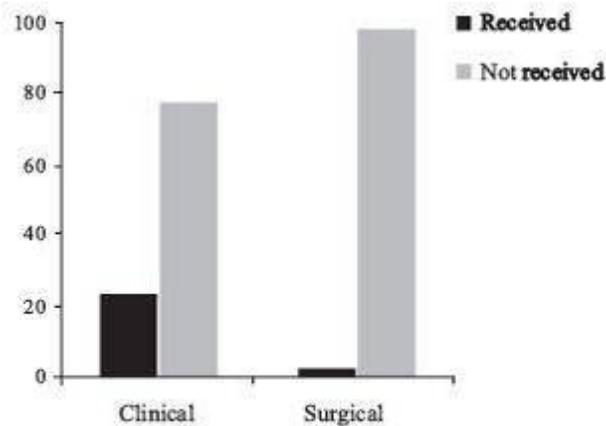


Figure 1 - Difference in use of prophylaxis for deep vein thrombosis, considering medical prescription, in all surgical and clinical patients

## Discussion

DVT prophylaxis is needed and crucial to prevent complications, such as pulmonary thromboembolism, and sequelae, such as postthrombotic syndrome. Mainly due to DVT silent nature, PE is often its first manifestation.<sup>25-27</sup>

In the 1960's, the natural history of venous thromboembolism was well established after the contributions by Kakkar et al.<sup>28</sup> Their studies demonstrated that clinical examination of DVT alone has low reliability, since they detected that 50% or more of DVT cases had no clinical signs. Based on that discovery, prophylaxis for DVT and

PE gained a new perspective, allowing creation of consensus and recommendations for each risk group for that entity.<sup>29</sup> However, venous thromboembolism is still the main cause of sudden death in hospital beds.<sup>18</sup>

Prophylaxis is described as beneficial and, since groups of patients at low, moderate and high risk for the development of DVT can be identified, it is reasonable and desirable to consider prevention forms, which is much better than treatment.<sup>9</sup> Although accessible, prophylaxis for DVT is still underused, even in developed countries, as demonstrated in the study published by Goldhaber & Tapson, in which out of 2,726 patients diagnosed with DVT during their hospital stay, only 1,147 (42%) had been given prophylaxis over a 30-day period before diagnosis.<sup>30</sup>

This study shows an even worse situation, since out of 198 patients indicated to receive pharmacological and/or physical prophylaxis, only 6% of high-risk patients and 18% of moderate-risk patients were given prophylaxis. Lack of prophylaxis prescription for patients indicated to receive it was higher in the group of surgical patients, in which 97.9% of patients were not given adequate prophylaxis considering their risk. In the clinical group, 77% of patients with indication were not given prophylaxis. Other studies performed in different types of hospital in our country also showed underuse of DVT prophylaxis: Garcia et al.<sup>1</sup> verified that only 24% of patients were given pharmacological prophylaxis for DVT; Caiafa & Bastos<sup>4</sup> found that 59% of patients were submitted to adequate prophylaxis; Engelhorn et al.<sup>20</sup> demonstrated that in 12.7% of cases prophylaxis was being used; Marchi et al.<sup>27</sup> showed similar results with only 12.6% of cases with

adequate prophylaxis; and Franco et al.,<sup>31</sup> in an evaluation of a teaching hospital, observed that 26.4% of patients were given prophylaxis.

A possible explanation for not using prophylaxis for DVT in surgical patients is concern by health professionals as to risk of bleeding during the surgery that may be caused by use of anticoagulant agents.<sup>20</sup> Another justification for not using prophylaxis is its financial cost. However, Bergqvist et al.<sup>32</sup> showed that use of prophylaxis, when correctly indicated, has a positive cost-benefit ratio.

Another possibility to explain underuse of prophylaxis are doubts regarding classification of risk groups and adequate indication for each group, since there are many published classifications of risk, some more suitable for clinical patients and others better for surgical patients, such as the score by Nicolaides et al.<sup>9</sup>

As to prophylaxis adequacy, it can be seen that, even having many technically adequate prophylactic schemes available, both pharmacological and physiotherapeutic, they are not always followed.<sup>27</sup>

Educational programs about adequate prophylaxis of DVT for health professionals are extremely important. Anderson et al. reported an increase in use of prophylaxis from 29 to 52% in hospitalized patients with major risk for development of DVT, after introduction of educational strategies with the aim of warning professionals for the importance of thromboembolism prevalence. Prophylaxis was higher in hospitals in which health professionals often attended educational programs. Knowledge of statistical data about thromboembolic disease in the hospital they worked was an important factor that motivated them to use prophylaxis.<sup>33</sup>

## Conclusion

Based on data analysis, it can be concluded that prophylaxis for DVT is being underused, both in clinical and surgical patients, despite its efficacy having been confirmed in several studies.

In our study, prophylaxis for DVT was not used in most patients, clinical or surgical, and in those in which it was used, most was not performed adequately. This brief study demonstrated the need of continuous education for health professionals and institutional educative campaigns for further change in this situation, generating unquestionable benefits for patients and hospitals.

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