

An evaluation of thromboembolism prophylaxis in acutely ill medical patients

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Summary

Aim of the study: To examine the frequency and adequacy of thromboprophylaxis in acutely ill medical patients hospitalised in a primary-tertiary care hospital.

Methods: We carried out a cross-sectional study of 266 patients hospitalised in the three medical services of the University Hospital of Geneva. After exclusion of patients (64) treated by therapeutic anticoagulation, 202 patients were included. The appropriateness of thromboprophylaxis was assessed by means of explicit criteria developed by the Hôpital Lariboisière, Paris, France.

Results: Overall, 87 patients (43.1%) received thromboprophylaxis. With explicit criteria, this percentage decreased to 37.6% ($p = 0.25$). According to the explicit criteria used, about half of the patients were unnecessarily treated, whereas 42% of the patients who should have been treated were not. Agreement between implicit criteria

(or observed treatment rate) and explicit criteria assessed by kappa coefficient is 0.2. Two services (A, B) had an overuse of thromboprophylaxis ($p = 0.002$) and service C tended to under-use thromboprophylaxis ($p = 0.45$).

Conclusion: Even though the appropriateness of the applied explicit criteria has not been thoroughly validated, these results suggest that implicit criteria are associated with considerable uncertainty leading to both over or under-use of thromboprophylaxis. Further research is needed to better understand thromboembolic risk factors in acutely ill medical patients and to elaborate explicit evidence-based criteria for thromboprophylaxis in this setting.

Key words: thromboprophylaxis; medical patients; guidelines

Introduction

Deep vein thrombosis and pulmonary embolism are potentially serious affections caused by a combination of genetic and environmental factors, including immobilisation and surgery. The need for systematic thromboprophylaxis following surgery is based on the high prevalence of postoperative deep venous thrombosis (DVT) and pulmonary embolism (PE), the clinically silent nature of thromboembolic disease, and the potential for major adverse clinical outcomes [1]. However, this practice cannot necessarily be extrapolated to hospitalised medical patients except for certain groups of patients (myocardial infarction, paralytic stroke [9, 10]). The risk seems less in these patients and there is no clear consensus because of divergent data. Several studies on small patient samples did not provide consistent results to support systematic prophylaxis [2–8]. More recently, the

MEDENOX study [11] showed a highly significant reduction of venous thromboembolism by thromboprophylaxis with low-molecular weight heparin enoxaparin (at a daily dose of 40 mg subcutaneously) in acutely ill medical patients (5.5% vs. 14.9% with placebo, 63% relative reduction). Interestingly, the rate of phlebographic DVT by Day 10 (15%) in the placebo group was similar to the rates observed after general abdominal surgery [1].

Because information about the use of thromboprophylaxis in hospitalised medical patients is scarce in general and in our institution, we carried out a survey aiming at (1) establishing the proportion of patients given thromboprophylaxis in internal medical services; and (2) assessing appropriateness of thromboprophylaxis according to predefined explicit criteria.

Methods

This cross-sectional study was performed at the Department of Internal medicine of a public teaching hospital (Geneva University Hospitals, Geneva, Switzerland). This is the only public primary-tertiary care hospital of a region of about 400 000 inhabitants. On the day of survey, all patients hospitalised in one of the three internal medicine services were included (called hereafter Services A, B and C). The survey was performed on three distinct days in early 2001, one day in each service of medicine, within a 5-week period.

Table 1

Explicit criteria for thromboprophylaxis appropriateness in hospitalised medical patients.

Major factors (at least one factor)	
Paralytic stroke	
Acute myocardial infarction	
Acute respiratory failure	
Acute cardiac failure	
Acute illness + past history of thromboembolism	
Acute illness + hypercoagulable state	
Minor factors (at least two factors)	
Sepsis	
Malignant tumour / evolving myeloproliferative disorder	
Inflammatory disease	
Nephrotic syndrome	
Contraceptive or substitutive hormone therapy	
Dehydration	
Additional factors (one additional and at least one minor factor)	
Age >60	
Confined to bed	
Obesity	
Chronic Venous insufficiency	

Information was abstracted from medical and nursing records. The appropriateness of diagnoses was not evaluated. The diagnosis of obesity was accepted if the body mass index was equal to or higher than 30 kg/m² irrespective of gender. Whenever the BMI could not be calculated but where obesity was noted, it was accepted.

One single investigator (P.Chm.) filled out a standard sheet for each patient present in the wards at the given day. In particular, the administration of anticoagulant drugs was recorded. Physicians in charge of patients were not informed of the aims of the study in order to avoid bias due to previous information.

The main outcome variable was the appropriateness of thromboprophylaxis, assessed by a slightly modified version of explicit criteria developed at a French university hospital (Hôpital Lariboisière, Paris, France, courtesy of Professor J.-F. Bergmann) (table 1). These recommendations did not undergo any validation procedure. They are based, however, on the presently available evidence [2–11]. These recommendations were slightly amended to incorporate recent findings from the literature; specifically, postmenopausal hormonal substitution therapy was incorporated as risk factor at the same level as hormonal contraceptive therapy. The presence of one major criterion, two minor criteria or one minor with one additional criterion was necessary to justify a prophylactic anticoagulation. The observed treatment rate, according to the decision of the physician in charge, has been called “implicit” throughout the paper, as opposed to the suggested treatment rate derived from the explicit criteria.

Statistical analysis

Data were analysed by means of SPSS (SPSS-windows, SPSS Inc, Chicago, Ill, version 10.1). The main outcome was a comparison of proportions of patients treated with thromboprophylaxis using implicit or explicit criteria. These proportions were compared using the χ^2 test. The level of statistical significance was set at $p \leq 0.05$.

Results

A total of 266 patients were hospitalised on the day of survey. 64 patients were excluded because they were receiving anticoagulant therapy at ther-

apeutic doses. Thus, 202 patients were included. Their characteristics are displayed in table 2. There was no significant difference in age and gender distribution among the three services.

Table 2

Demographic data of patients.

	services			total	P
	A	B	C		
n	83	62	57	202	
Mean age (\pm SD)	68 \pm 17.2	64 \pm 15.4	71 \pm 15.7	67 \pm 16.4	0.086
Male/female	44 / 39	30 / 32	25 / 32	99 / 103	0.56

Table 3

Rate of thromboprophylaxis according to implicit or explicit criteria.

	services			P
	A	B	C	
Implicit criteria (%)	25/83 (30.1)	30/62 (48.4)	32/57 (56.1)	0.006
Explicit criteria (%)	34/83 (41.0)	22/62 (35.5)	20/57 (35.1)	0.71

Frequency of thromboprophylaxis

Overall, 87 patients (43.1%) were receiving prophylactic anticoagulation. The rate of prevention was 30.1% in Service A, compared with 48.4% in Service B ($p < 0.05$, as compared with A) and 56.1% in Service C ($p < 0.01$, as compared with A) (table 3). Patients treated with thromboprophylaxis were 7.7 years older than those without prophylaxis ($p = 0.001$).

Appropriateness of thromboprophylaxis

According to the explicit criteria previously defined, 76 patients (37.6%) should have been given prophylactic anticoagulation. The difference between the overall rate of thromboprophylaxis

Table 4
Appropriateness of thromboprophylaxis.

Anticoagulation justified according to implicit criteria	according to explicit criteria		total
	no	yes	
No	83	32	115
Yes	43	44	87
Total	126	76	202

Kappa coefficient = 0.21

Table 5
Overuse of thromboprophylaxis according to explicit criteria.

Thromboprophylaxis not justified according to explicit criteria	services			P
	A	B	C	
Thromboprophylaxis effectively prescribed n, (%)	8 (16.3)	16 (40)	19 (51.4)	0.002

Table 6
Underuse of thromboprophylaxis according to explicit criteria.

Thromboprophylaxis justified according to explicit criteria	services			P
	A	B	C	
Thromboprophylaxis effectively not prescribed n, (%)	17 (50)	8 (36.4)	7 (35)	0.45

Table 7
Explicit criteria and appropriateness of thromboprophylaxis.

	thromboprophylaxis (%)
Major factors (at least one)*	29/45 (64)
Paralytic stroke	8/10
Acute myocardial infarction	3/3
Acute cardiac failure	4/7
Acute respiratory failure	10/20
Acute illness + past history of thromboembolism	7/9
Minor criteria (at least two)	1/3 (33)
Additional factors (one minor criterion plus one additional criterion)	14/28 (50)
Total	44/76 (58)

* Total differs because 4 patients had 2 major criteria

laxis with and without explicit criteria was not statistically significant ($p = 0.25$). However, 43 patients (49.4%) who received thromboprophylaxis on the basis of implicit criteria were unnecessarily treated and 32 patients (27.8%) who were not treated should have been (table 4). Two services (B, C) had an overuse of thromboprophylaxis ($p = 0.002$), one service (A) tended to underuse thromboprophylaxis, which was, however, not statistically significant ($p = 0.45$) (tables 5 and 6). Among the 45 patients showing at least one major risk factor, 16 (35.6%) did not receive any prophylaxis. 50% of patients with one minor criterion plus one additional were treated (table 7).

Among the 126 patients who had no indication for prophylactic anticoagulation, 43 (34.1%) were treated (table 4). Among them, 37 had a minor criterion or an additional criterion, which did not justify anticoagulation, and 6 patients did not have any criteria. The following criteria were recorded: age above 60 alone ($n = 18$); age above 60 plus bed rest ($n = 9$); bed rest alone ($n = 3$); age above 60 plus obesity ($n = 2$); active cancer ($n = 2$); age above 60 plus bed rest plus obesity ($n = 1$); age above 60 plus chronic venous insufficiency ($n = 1$); inflammatory disease alone ($n = 1$). Agreement between implicit and explicit criteria assessed by the kappa coefficient was 0.21 (kappa values below 0.40 represent a poor agreement, while values ranging from 0.75 to 1.0 mean excellent to perfect agreement, and a kappa of 0 means only random agreement).

Discussion

Currently, thromboprophylactic treatments for hospitalised non-surgical patients are left to the appreciation of doctors, except for two medical conditions, stroke and acute myocardial infarction for which prophylaxis is strongly recommended [1]. In the present survey of three medical services of a primary-tertiary care hospital, this prophylaxis was justified in only half of the cases, when compared with predefined criteria. In addition, agreement between implicit and explicit criteria was poor. More worrying was the fact that almost one third of patients not given prophylaxis should have been receiving it according to the criteria mentioned above, including a large number of patients with active malignant disease. Of some concern is also the difference in the rate of thromboprophylaxis among the three services.

Although some particularities of the patients could partly explain these different rates, they are likely to be due to arbitrary attitudes. Indeed, these differences tend to disappear with the use of the explicit criteria (table 3).

One limitation of the present analysis resides in the fact that the explicit criteria used had never been validated previously. Nevertheless, they are fully compatible with the only large scale randomised controlled study in the field published so far [11].

In conclusion, decision for thromboprophylaxis seems too random in acutely ill medical patients. Further research is needed to develop explicit, evidenced-based criteria and to standardise

the indications for thromboprophylaxis in this patient population. Development of guidelines would be very helpful.

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