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VENOUS THROMBOEMBOLISM RISK FACTORS AND PRACTICES OF PROPHYLAXIS
Endorse Study Results in Portugal

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SUMMARY

Background: Venous thromboembolism (VTE) risk assessment is a cornerstone for the achievement of best practices and outcomes. Epidemiologic data and practices related to venous thromboprophylaxis as considered by the global ENDORSE study, (Epidemiologic International Day for the Evaluation of Patients at Risk for Venous Thromboembolism in the Acute Hospital Care Setting), enrolled 68,183 patients from 32 countries, in wich Portugal. Within ENDORSE, data from all participant countries analyzed to determine their risk of VTE and to evaluate the suitability of prophylaxis.

Methods: European patients were enrolled from randomly selected hospitals in Portugal (European Hospital Register), according to ENDORSE study inclusion/exclusion criteria. The Seventh ACCP evidence-based consensus guidelines were employed to evaluate VTE risk and prophylaxis use.

Results: From a total of 3,145 beds assessed, 2,183 were considered eligible and 1,632 met all criteria. Of these, 860 (52.7%; 95% CI 50.3-55.1) were at risk of VTE: 525 surgical patients (68.9%; 95% CI 65.5-72.1) and 335 medical patients (38.5%; 95% CI 35.3-41.2). The rate of prophylaxis according to ACCP guidelines in overall patients at risk was 58.5% (503 patients). The prophylaxis rate for VTE was 59% (310 patients) in surgical patients and 57.6% (n=193) in medical patients. 39.7% of surgical patients and 39.4 % of medical patients who did not meet the criteria for prophylaxis were also on prophylaxis with an anticoagulant, which was considered to be inappropriate.

Conclusions: More than a half of these hospitalized patients in Portugal were deemed at risk of VTE and less than two-thirds of them received appropriate prophylaxis. New strategies are required for implementation of venous thromboprophylaxis in Portuguese hospitals.

RESUMO

DOENTES EM RISCO DE TROMBOEMBOLISMO VENOSO E PRÁTICAS DE TROMBOPROFILAXIA
Resultados do Estudo ENDORSE em Portugal, Práticas de Tromboprofilaxia

Introdução: A avaliação de risco de tromboembolismo venoso (TEV) é determinante para o desenvolvimento de melhores práticas de prevenção e obtenção melhores indicadores de resultado. Os dados epidemiológicos recolhidos no estudo ENDORSE Global ou no caso dos dados de país serem estatisticamente significativos para o mesmo, são factores chave para o conhecimento da avaliação e gestão clínica do TEV assim como para a tomada de

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novas atitudes perante a doença. O objectivo da actual análise é a avaliação dos dados de Portugal no ENDORSE, assim como sensibilizar para o risco de TEV determinado nos doentes internados nos hospitais portugueses e a adequação da profilaxia nessa população.

Métodos: A selecção dos doentes obedeceu aos critérios de inclusão / exclusão do estudo ENDORSE em nove hospitais Portugueses aleatoriamente seleccionados a partir do Registo Europeu dos Hospitais. Para avaliar o risco de TEV e profilaxias usadas serviram como referência as recomendações da sétima revisão de consensus sobre tromboembolismo venoso do American College of Chest Physicians.

Resultados: Num universo de 3145 camas de internamento avaliadas, 2183 foram consideradas elegíveis e 1632 preencheram todos os critérios de inclusão. Destes últimos 1632 doentes apenas 860 (52,7%, 95% CI 50,3-55,1) estavam em risco de TEV: 525 doentes cirúrgicos (68,9% 95% CI 65,5-72,1) e 335 doentes médicos (38,5%, 95% CI 35,3-41,2). A taxa de profilaxia (de acordo com as recomendações do ACCP) foi de 58,5% (503 doentes), que corresponde a 59% (310 doentes) dos doentes cirúrgicos e 57,6% (n = 193) dos doentes médicos. Dos doentes cirúrgicos (39,7%) e dos doentes médicos (39,4%) que não preenchiam os critérios para a profilaxia foram, também, submetidos a profilaxia com anticoagulante considerada como inadequada, à luz das recomendações ACCP.

Conclusões: Tendo por base os dados do Estudo ENDORSE relativamente a Portugal, mais da metade dos nossos doentes internados estão em risco de TEV e menos de dois terços recebem a profilaxia adequada. Neste contexto alerta-se para a exposição dos doentes a riscos desnecessários e para a necessidade de definição de novas estratégias de segurança tendentes uma adequada tromboprofilaxia venosa nos hospitais Portugueses.

INTRODUCTION

Venous thromboembolism is a well known problem in hospitalized patients[1,2] and a very significant cause of death in Europe[3] and in the USA[4-6]. Despite guidelines and recommendations, clinicians are prone to underestimate the risk of venous thromboembolism (VTE) as a cause for fatal outcome in hospitalized patients as well as in the outpatient setting[7].

The confidence in evidence-based medicine and the need for developing standards for practice, seems quite new according to current compliance and the rate of implementation of recommendations and guidelines[8]. Doctors act in contradiction to well and long time documented evidence of recommendations in this field, with evident detriment of patient's safety.

In Portugal, International Guidelines are generally well accepted and in particular, Scientific Societies directly assume them. The direct evidence and clear illustration of the problem has been demonstrated by ENDORSE, the largest international prophylaxis evaluation study ever performed, in randomly selected hospitals around the world[9]. The main objectives were to identify patients at risk for VTE and the proportion of patients who receive appropriate VTE prophylaxis according to the American College of Chest Physicians[9](ACCP) evidence-based consensus guidelines.

The aim of the current publication is to call attention to Portugal-specific ENDORSE data, namely inpatients at risk of VTE and current practices of prophylaxis.

METHODS

The methodology of the global ENDORSE study was followed[10].

Patients were enrolled from nine randomly selected hospitals in Portugal, (Figure 1) identified from eligible hospitals on the European Hospital Register[11].

All randomized hospitals were public, providing general, acute care; three hospitals were University-linked. At the end of 2006, the Portuguese National Health Service comprised 58 public, multispecialty hospitals, providing 20,615 acute care beds[1] for a

population of 10,6 million. The median number of beds per hospital was 351 (range 95–615 beds). No reference to hospital VTE protocols was found, despite some references to individual service protocols.

The small size data of individual hospitals within the country invalidated an inter-hospital evaluation of variation practices in prophylaxis.

Inclusion criteria: Patients ≥40 years-old and admitted to a medical ward, or who were ≥18 years-old and admitted in a surgical ward or admitted for a nonsurgical trauma, were enrolled to assess their risk of VTE. Patients were considered ineligible or excluded from the study, if their chart was unavailable, if were admitted to an ineligible ward, or if they were admitted for treatment of VTE. Enrolled patient charts were reviewed, including medical history, current medical conditions, type of surgery, initiation and type of VTE prophylaxis.

Primary objectives: Risk assessment for VTE.

Enrolled patients were assessed for risk of VTE in accordance with the 2004 ACCP guidelines, including acutely ill medical patients and those admitted for major trauma or undergoing a major surgical procedure requiring general or epidural anesthesia for at least 45 minutes. Surgical patients were first assessed, for age, type of surgery, and duration of anesthesia, and then classified as being at highest, high, moderate, or low risk for VTE, according to the ACCP guidelines.

Secondary objective: VTE prophylaxis.

Fig. 1– Hospital distribution – Portugal, 10.6 million inhabitants

The use of recommended types of VTE prophylaxis received by at-risk patients was defined according to specific recommendation from the 2004 ACCP guidelines for the different types of patients at risk, and, designated as appropriate prophylaxis (ApP). Patients considered not at risk using the ACCP consensus guidelines and on pharmacological prophylaxis were considered to be submitted to inappropriate prophylaxis (InP).

Patients were considered to have major bleeding, if they developed during hospitalization any of the following: intracranial hemorrhage, hepatic impairment, bleeding at hospital admission, active gastroduodenal ulcer, or a known bleeding disorder, or were considered to have a contraindication to anticoagulation prophylaxis. Data from all eligible charts, in selected wards, at each hospital, was completed by medical interns and hospital investigators within 10 days, and collected by Keypoint[1] team. Extracted data included: patient demographics, admission and post-admission diagnoses, risk factors associated with VTE (defined in the ACCP guidelines). Risk factors for bleeding, hospitalization duration, and type of VTE prophylaxis (defined in the ACCP guidelines), were also evaluated. Only the total patients in the country were be considered, due to the small number of patients included by hospital and by pathology.

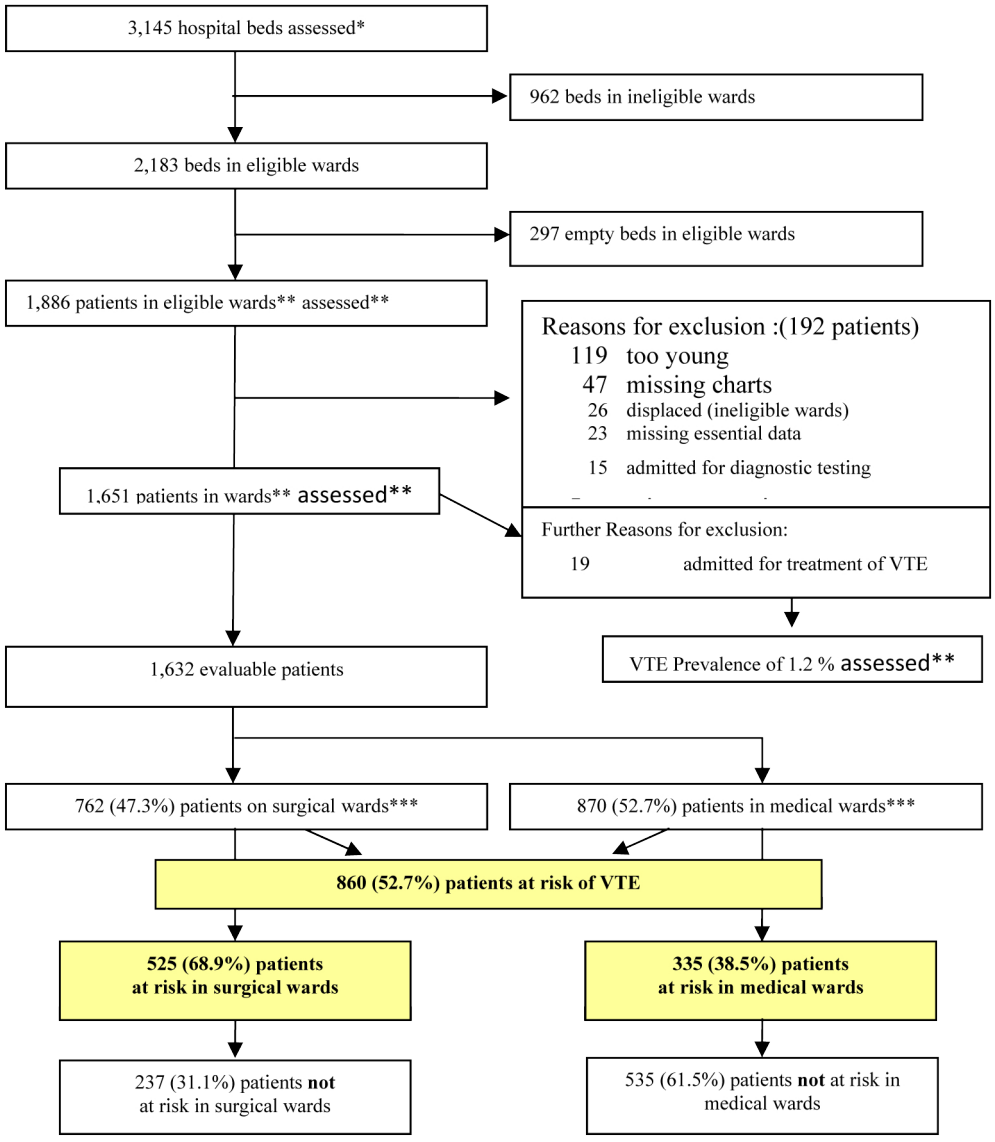
Statistical Analysis: Quantitative data were summarized as median and interquartile range (IQR). Categorical data were summarized into number and percentage of the population. Rates were calculated from individual patient data. Rate comparisons were performed using Tests for Proportions Comparison; 95% CI were calculated for the main outcomes. A significance level of 0.05 was assumed for all statistical calculations.

RESULTS

Global ENDORSE data showed that of the 57,570 patients included in the final analysis, 21,219 (37%) were surgical and 36,351 (63%) were medical patients. 64% of the surgical patients and 42% of the medical patients were deemed to be at risk of VTE according to ACCP criteria. ACCP recommended prophylaxis was prescribed to 58.5% of the surgical patients, and to 39.5% of the medical patients at risk of VTE (proportion surgical / medical at risk = 2.2)[10]. These findings fulfilled a need for country-specific data extracted from the global data.

Portugal study population

The number of beds assessed in Portugal, and reasons for exclusion of patients assessment, are shown in Figure 2, together within the number of evaluable medical and



* Based on Hospital Enrolment Forms
**Based on Patient Enrollment Logs, includes patients who did not meet protocol requirements (e.g. age, type of condition, or missing hospital chart)
*** "Surgical Patients" include patients in general surgical units, surgical ICUs, neurosurgery, genecology, and orthopedics. "*Medical Patients*" include patients in other eligible wards.

Fig. 2 - Patient sample population and reasons for exclusion

Table 1– Demographic and anthropometric characteristics of the patients studied

	Portuguese Patients evaluated			Portuguese patients at risk o VTE		
	Surgical patients	**Medical patients**	**Total**	**Surgical patients**	**Medical patients**	**All Risk**
	(n=762)	**(n=870)**	**(n=1,632)**	**(n=525)**	**(n=335)**	**(n=860)**
Sex (female)	362/729 (49.7%)	377/846 (44.5%)	739 (45.3%)	263/521 (50.5%)	144/333 (43.2%)	407(47.7%)
Median Age (years)	734 (68)	853 (72)	1587(70)	525 (68)	335 (75)	860(71)
Median Body Mass Index (BMI)Kg/m^2	124 (26.9)	50 (25.1)	174(26.0)	103 (26.9)	19 (27.4)	122((26.9)
Median Length of hospitalization up to survey date	726 (6)	847 (7)	1573(6)	518 (6)	334 (8)	852 (7)

Table 2– Comparison of Portuguese and Global demographic and anthropometric characteristics

	Surgical Patients at Risk			Medical Patients at Risk		
	Portugal (n=525)	Global (19,842)	*P**	Portugal (n=335)	Global (15,487)	*P**
Female	51%	51%	1	43%	47%	0.145
Age(median)	68	68	1	75	70	>0.05
BMI,Kg/m2 (median)	26.9	25.9	>0.05	27.4	26.0	>0.05
Hospital admission to survey day, days (median)	6	5	>0.05	8	6	<0.05

**p* estimated from aggregated data

Table 3- Risk Factors for Venous Thromboembolism

	Risk Factors for VTE	Surgical (525)		Medical (335)		All (860)	
		n	%	n	%	n	%
Conditions Before Hospital admission	Chronic pulmonary disease	16	3.9%	61	20.1%	77	10.8%
	Chronic heart failure	10	2.5%	49	16.1%	59	8.3%
	Obese (based on physician's note)	24	5.9%	21	6.9%	45	6.3%
	Varicose veins or venous insufficiency	30	7.4%	9	3.0%	39	5.5%
	Long term immobility	6	1.5%	23	7.6%	29	4.1%
	Previous venous thromboembolism	0	0.0%	5	1.6%	5	0.7%
	Contraceptives	5	1.2%	0	0.0%	5	0.7%
	Thrombophilia (laboratory documented)	0	0.0%	1	0.3%	1	0.1%
	Post-menopausal hormone replacement therapy	1	0.2%	0	0.0%	1	0.1%
	Pregnancy (within 3 months)	1	0.2%	0	0.0%	1	0.1%
Conditions present at hospital admission	Other medical condition	173	33.0%	35	10.0%	208	24.2%
	Pulmonary infection	13	2.5%	153	45.7%	166	19.3%
	Other cardiovascular disease	66	12.6%	67	20.0%	133	15.5%
	Malignancy (active)	90	17.1%	29	8.7%	119	13.8%
	GI/Hepatobiliary	72	13.7%	20	6.0%	92	10.7%
	Infection (non-respiratory)	45	8.6%	36	10.7%	81	9.0%
	Endocrine/Metabolic	40	7.6%	27	8.1%	67	7.8%
	Acute non-infectious respiratory disease	7	1.3%	53	15.8%	60	7.0%
	Acute heart failure (NYHA Class III or IV)	1	0.2%	51	15.2%	52	6.0%
	Neurologic	28	5.3%	24	7.2%	52	6.0%
	Renal	16	3.0%	19	5.7%	35	4.1%
	Ischemic stroke	0	0.0%	34	10.1%	34	4.0%
	Hematologic disease	15	2.9%	13	3.9%	28	3.3%
	Hemorrhagic stroke	2	0.4%	17	5.1%	19	2.2%
	Rheumatologic or inflammatory	14	2.7%	2	0.6%	16	1.9%
Additional risk factors for VTE DURING hospital episode	Complete immobilization	151	28.8%	106	31.6%	257	29.9%
	Immobile with bathroom privileges	49	9.3%	45	13.4%	94	10.9%
	Mechanical ventilation	34	6.5%	45	13.4%	79	9.2%
	Central venous catheter	46	8.8%	28	8.4%	74	8.6%
	Admitted to ICU/CCU	39	7.4%	33	9.9%	72	8.4%
	Cancer therapy	2	0.4%	2	0.6%	4	0.5%
	Heparin induced thrombocytopenia	0	0.0%	0	0.0%	0	0.0%

Table 4- Comparison of Portuguese and Global data on the most prevalent pathologies in surgery and in medicine wards

At Risk	SURGICAL Pts	MEDICAL Pts
	Malignancy	Pulmonary Infection
Portugal	17.1%	45.7%
Global	8.8%	31.2%
p	<0.001	<0.001

surgical patients.

Of 3,145 beds assessed, 2,183 were considered eligible. A total of 1,886 patients were assessed (297 empty beds); with 1,632 patients meeting all criteria. The reasons for exclusion were insufficient age (119), missing charts (47), displaced patients (26) age less than 18 years old, missing essential data (23), VTE treatment (19) and testing or minor operations (20). Excluding missing and inadequate data, the total number of patients assessed was 1,651. Of these, 19 were admitted for VTE treatment, and consequently excluded from the study. Considering the 1,632 enrolled patients, the VTE hospital estimated prevalence was 1.2%, in adult selected wards.

Primary Objectives

Of the 1,632 enrolled patients, 762 were on surgical wards (47.3%; 95% CI 44.9%-49.7%), with 525 deemed to be at risk of VTE, according to ACCP guidelines (68.9%; 95% CI 65.5%-72.1%), and 870 patients were on medical wards (52.7%; 95% CI 50.3%-55.1%), of whom 335 (38.5%; 95% CI 35.3%-41.2%) were deemed at risk of VTE. The proportion of patients at risk was 1.8 (surgical/medical).

The number of patients not at risk for VTE, according to ACCP, was 772 in the studied population: 237 (31.1%; 95% CI 27.9%-34.5%) patients in surgical wards; and 535 (61.5%; 95% CI 58.25-64.7%) patients in medical wards.

Patient characteristics: Demographic and anthropometric characteristics of evaluated patients and patients at risk of VTE are summarized in Table 1.

Table 5– Risk Factors for Bleeding

	Patients	Surgical		Medical		All	
Risk factors for bleeding PRESENT	Aspirin on admission	20	3.8%	71	21.2%	91	10.6%
	NSAID on admission (excluding aspirin)	39	7.4%	19	5.7%	58	6.7%
	Significant renal impairment	21	4.0%	23	6.9%	44	5.1%
	Bleeding at hospital admission	25	4.8%	9	2.7%	34	4.0%
	Low platelet count (<100,000 per ul)	8	1.5%	17	5.1%	25	2.9%
	Hepatic impairment (clinically relevant)	10	1.9%	15	4.5%	25	2.9%
	Intracranial hemorrhage	10	1.9%	12	3.6%	22	2.6%
	Active gastroduodenal ulcer	7	1.3%	2	0.6%	9	1.0%
	Known bleeding disorder (congenital or acquired)	3	0.6%	5	1.5%	8	0.9%

Secondary Objectives: 52.7% (860) of patients at risk received prophylaxis according to ACCP guidelines (Table 6).

Table 6-Patients at risk of VTE and type of prophylaxis administered

Population	Surgical(762)		Medical(870)	
	n	%	n	%
Patients at Risk of VTE	525	68.9%	335	38.5%
None (Omission of Px)	206	39.2%	130	38.8%
Any anticoagulant	312	59.4%	203	60.6%
ACCP recommended prophylaxis	310	59.0%	193	57.6%
Contraindications to Anticoagulant Px	42	8.0%	36	10.7%
Patients at risk without contraindications for Px	483	92.0%	299	89.3%
Appropriate Px (ACCP)	310	64.2%	193	64.5%
	n	%	n	%
Patients with no Risk of VTE	209	27.4%	518	59.5%
None (no Px)	126	60.3%	296	58.8%
Any anticoagulant : Inappropriate Px (ACCP)	83	39.7%	207	39.9%
LMWH	79	95.2%	186	89.9%
UFH	2	95.7%	7	3.4%
Vit. K antagonist	5	6.0%	26	12.6%

The median age of patients at risk for VTE in surgical wards was 68 (IQR 54-77) years, median BMI was 26.9 (IQR 23.4-29.3) kg/m2, and 263 (50.5%) were women.

The median age of patients in medical wards judged to be at risk for VTE was 75 (IQR 63-83) years old, median body mass index (BMI) was 27.4 (IQR 22.9-29.3) kg/m^2, and 144 (43.2%) were women.

For the total population at risk, the median length of hospital stay up to survey date was 7.0 (IQR 3.0-14.0) days; 6.0 (2.0-13.0) days for those in surgical wards, and 8.0 (IQR 4.0-14.0) days for patients in medical wards.

No difference was found in gender, age or BMI between the Portugal and Global demographics (Table 2). Only the hospital length of stay to survey was statistically significant (p<0.05) in medical patients. This value of p was obtained from aggregated data.

Risk Factors

The five most frequent clinical conditions prior to hospital admission were chronic pulmonary disease, chronic heart failure, obesity, venous insufficiency and long term immobility (Table 3). Also observed at admission were *other medical conditions* (in 33.0% of surgical patients) and *pulmonary infection* (in 45.7% of medical patients). Malignancy played a more important role in surgical than in medical patients, 17.1% *vs*. 8.3% (p<0.001).

The most striking risk factor during the current inpatient episode was *complete immobilization* (29.9%), and a *partial immobilization* (with bathroom privileges)

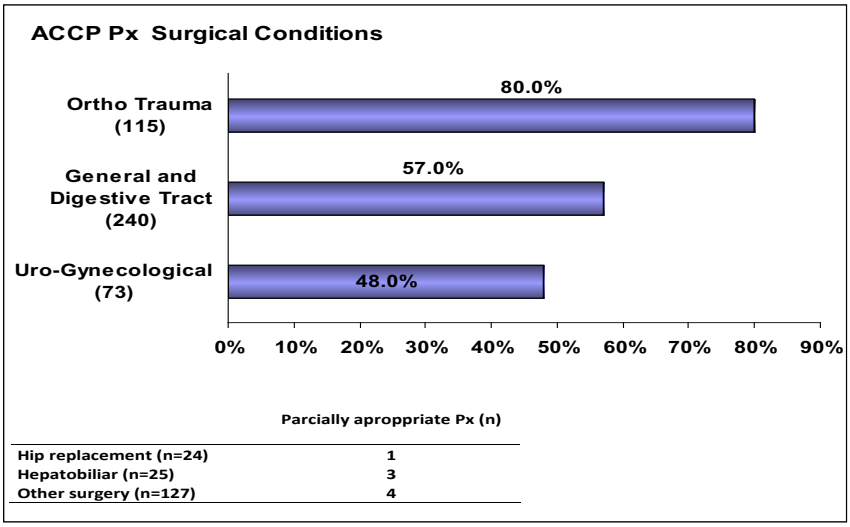


Fig. 3– Prophylaxis administered to surgical patients, by type of surgery and VTE risk (%)

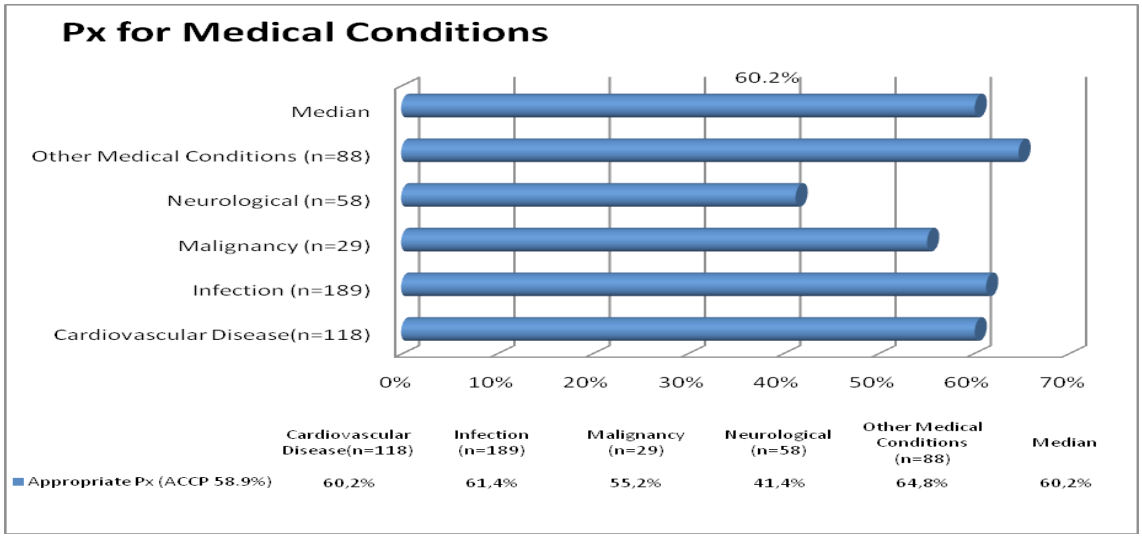


Fig. 4– Prophylaxis administered to medical patients, by conditions present during hospital admission and VTE risk (%)

The majority (58.5%; 57.0%) of patients who received prophylaxis were treated with LMWH (Table 7).

Table 7– Type of prophylaxis administered to surgical and medical patients

Type of VTE Prophylaxis in Surgical and Medical Patients (n=1587)	Surgical		Medical	
	at Risk (n=525)	no Risk (n=209)	at risk (n=335)	no risk (n=518)
Any anticoagulant	59,4%	39,7%	60,6%	39,4%
Low molecular weight heparin	58,5%	37,8%	57,0%	35,9%
Unfractionated heparin	1,0%	1,0%	0,0%	0,0%
Vitamin K antagonist	1,0%	2,4%	42,0%	50,0%
Graduated compression stockings	3,0%	0,5%	0,9%	2,5%
None	39,2%	60,3%	38,8%	57,1%

(10.9%), which accounted for an overall prevalence of 40.8%.

No difference was found between the Portuguese and Global patients' profile risk for VTE, except for the most prevalent risk factors in surgical and medical patients, malignancy and pulmonary infection (p <0.001).

Contraindication to pharmacological prophylaxis

Risk factors for bleeding[11], are reported in Table 5. Some patients did have multiple risk factors. 42 surgical at risk patients (8.0%) and 36 medical at risk patients (10.7%) had contraindications and restrictions for pharmacological prophylaxis (Table 6).

Surgical patients

Any anticoagulant was prescribed to 59.4% (312) of surgical patients deemed to be at risk of VTE and recommended prophylaxis was applied to 59.0% of patients (310). Prophylaxis was provided to 48% of uro-gynecological, 57% of general and digestive tract surgery and 80% of ortho trauma surgery patients (Figure 3).

Medical Patients

Any anticoagulant was prescribed to 60.6 % (203) of medical patients deemed to be at risk of VTE, and 57.6% (193) were prophylaxed according to ACCP recommendations. Prophylaxis was provided to 60.2% of cardiovascular diseases, to 61.4% of infectious diseases, to 55.2% of malignancy patients, and to 41.4% of neurologic diseases (Figure 4).

The majority (58.5%; 57.0%) of patients who received prophylaxis were treated with LMWH (Table 7).

Patients with no risk of VTE (*ACCP*)

37.6% (290) of patients considered not to have evidence for VTE risk, were also prophylaxed with any anticoagulant, which was considered to be inappropriate (InP); 39.7% (83) of surgical patients, and 39.9% (207) of medical patients (Table 8).

No indication was found of the use of mechanical pneumatic devices for intermittent compression. Graduated compression stockings were used as the sole prophylaxis in 6 surgical patients at risk, and as an adjuvant prophylaxis in a further 16. It was also used in 4 medical patients at risk of VTE, and in 22 medical patients with no risk.

DISCUSSION

The ENDORSE study emphasizes the relevance of the theme[10], the worldwide distribution of hospital patients at risk, as well as evidence for the most advantageous strategies[12].

The hospitals selected for Portugal (Pt) seem to adequately represent the country's hospital framework for the purposes of the present study.

We found a prevalence of 1.2% of the exclusion criteria *treatment of* VTE in selected wards. One could assume that this would be mainly related to pulmonary embolism, given that deep vein thrombosis alone is consensually[13-15] and normally treated in the outpatient clinic, and only the serious cases are admitted as inpatients.

The proportion of patients at risk (surgical *vs.* medical) was 1.3 in the Global ENDORSE data and 1.6 (p <0.001) of the Portuguese study population. In terms of the proportion of hospital adult patients at VTE risk, Portugal (52.7%) is ranked fourth of 15 European countries, behind Spain

Table 8– Type of prophylaxis administered to surgical and medical patients

Type of VTE Prophylaxis in Surgical and Medical Patients (n=1587)	Surgical		Medical	
	at Risk (n=525)	no Risk (n=209)	at risk (n=335)	no risk (n=518)
Any anticoagulant	59,4%	39,7%	60,6%	39,4%
Low molecular weight heparin	58,5%	37,8%	57,0%	35,9%
Unfractionated heparin	1,0%	1,0%	0,0%	0,0%
Vitamin K antagonist	1,0%	2,4%	42,0%	50,0%
Graduated compression stockings	3,0%	0,5%	0,9%	2,5%
None	39,2%	60,3%	38,8%	57,1%

(61.3%), Germany (55.6%), and Bulgaria (54%)[10].

Comparison of the demographics of the Portuguese study population with the Global data revealed (Table 2) that Portuguese medical patients are older (75 *vs*.70), with higher BMI (27.4 *vs*. 26), and they stay longer in hospital (8 *vs*. 6), though the first two differences from Global surgical patients are not statistically significant. This is quite interesting, since only 38.5% of the medical patients were at risk[16]. This appears to be controversial, (medical patients are old), and a reason for further investigation, given that age is itself an independent risk factor[17,18], and the median age of the medical population was 75. There was no demographic difference in surgical population and in general profile between Portuguese and Global ENDORSE patients.

Even so, the prevalence of risk factors before hospitalization was similar to the Global Endorse data, as well as to other studies[10,19]. At admission, the main risk factors were *other medical conditions* in surgical patients and *pulmonary infections* in medical patients. The prevalence of malignancy in surgical patients was 17.0% in Portugal *vs*. 8.8% in Endorse Global (p <0.001). Why is there such a difference (more than double) in malignancy prevalence in surgical patients? Based on the National Hospital Database Report, most of the medical patients are followed in outpatient clinics and in day care services. As inpatients, either they are admitted for surgical treatment, or they stay in specialized oncology hospitals not considered in the present study. Immobilization is naturally the prevalent additional risk factor during hospital episodes (60.6%), as stated in other studies[20]

In some studies, findings of incorrect prophylaxis[4,21]have been reported.

From the Portuguese data, we can distinguish two groups:

The at risk patients provided with appropriate prophylaxis and the patients not at risk who were administered with inappropriate, unnecessary, prophylaxis.

In addition to prophylaxis not being provided to at risk patients (39.2% surgical; 38.8% medical), (Table 6), it is most striking that the rate omission of prophylaxis in patients at risk is the same as the rate of not at risk patients supposedly *wrongly* exposed to pharmacological prophylaxis, leading to an increased risk of bleeding, among others, and increased costs. Is this just compliance with guidelines or are medical patients, (a very small proportion at risk 38.5%, *vs* the burden of pathology and age for example), at a much higher risk, not validated by risk assessment in medical populations? These results could reflect a clinical adjustment to real risks, or indicate the existence of real risk factors in patients less than 40 years old, with the results reflecting a clinically correct decision. This is not a new phenomenon, having been reported several times[12,21,22].

Of 123,304 hospital admissions from 2001 to 2005 in the Health Facts Database (Cerner Corporation, Kansas City, MO), only 15.3 % of the patients with at risk medical conditions received prophylaxis according to 6th ACCP consensus guidelines[23].

We find less insufficient prophylaxis in surgical wards than in medical ones. Is this a result of stricter criteria for evaluation, consistently explained in guidelines, being more suitable for surgical patients? Alternatively, the approach to medical patients is misleading or unclear, leading to inaccurate prophylaxis and misjudgment of whom is at risk? Nevertheless, it is evident that prophylaxis has increased during the last 10 years and that there is a better awareness among the medical community of the benefit of good practice (VTE prophylaxis). No single strategy for improvement of VTE prophylaxis is sufficient[24]. There must be simple, objective tools (electronic or otherwise), incorporated in the clinical evaluation of the patient.It should be as easy to apply as those used for diabetes or hypertension. In the era of decision-making processes, risk assessment models (RAM) adjusted to population[25], are key tools for targeting individual risk, able to provide better and supported treatment choices to physicians. In a recent review[26], Frank Michota presents arguments about the difficulties and problems regarding the gap between evidence and practice in VTE prophylaxis. Quality is improving, as key opinion leaders, academic and professional groups and associations as well as national organizations, highlight the benefits and achievements of standards of care[27].

According to a current aphorism, it is very important, but not enough to look to the *forest*. This kind of action has been taken for some years, with impressive results. In 2001, a study of 330 US hospitals found prophylaxis to be administered to 26% of patients at risk. In 2004 they found the prophylaxis rate to be 33%[28]. The recent IMPROVE study[5] showed a rate of pharmacological and or mechanical VTE prophylaxis in hospital of 50% and ENDORSE has found a 50% prophylaxis rate in a much wider and heterogeneous data set[10]. It is now time to look up to the tree itself and acknowledge individual characteristics in tailoring the appropriate treatment for prevention of disease. The responsibility to the patient is individual, not collective. Surely, new clinical studies will give appropriate answers to these questions despite some concerns about evidence-based practice. *If we want more evidence-based practice, we need more practice-based evidence*, (Lawrence Green).

Limitations of the Portuguese ENDORSE study: Portuguese data reflect the problems of a cross-sectional epidemiological study related to a defined moment in time, with no further evaluation of duration of prevention, a key issue to validate the accuracy of thromboprophylaxis. Evaluations of charts are restrictive but data reflect the quality of clinical patient charts. It was found that the number of patients on mechanical compression stockings is

underestimated, since this item was recorded only when the doctor prescribed it on the chart. In Portugal, this procedure is considered a *service protocol* in orthopedics, neurosurgical and other areas, and applied directly by nurses without the need for prescription.

CONCLUSION

Despite disparities between populations (social, economic and ethnic), the Portuguese results are quite similar to Global findings. There is still a lack of concern in Portugal that thromboembolic events may occur in hospitalized patients, a prone group for developing Hospital-related VTE. The Portuguese ENDORSE findings demonstrate the high prevalence of patients at risk for VTE and the need to adjust the use of VTE prophylaxis, validating data to assume a national task force for a better practice, avoiding preventable deaths and poor long term outcomes.

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