

Prophylaxe venöser Thromboembolien **So einfach und doch so schwierig!**

Knut Kröger

Klinik für Gefäßmedizin

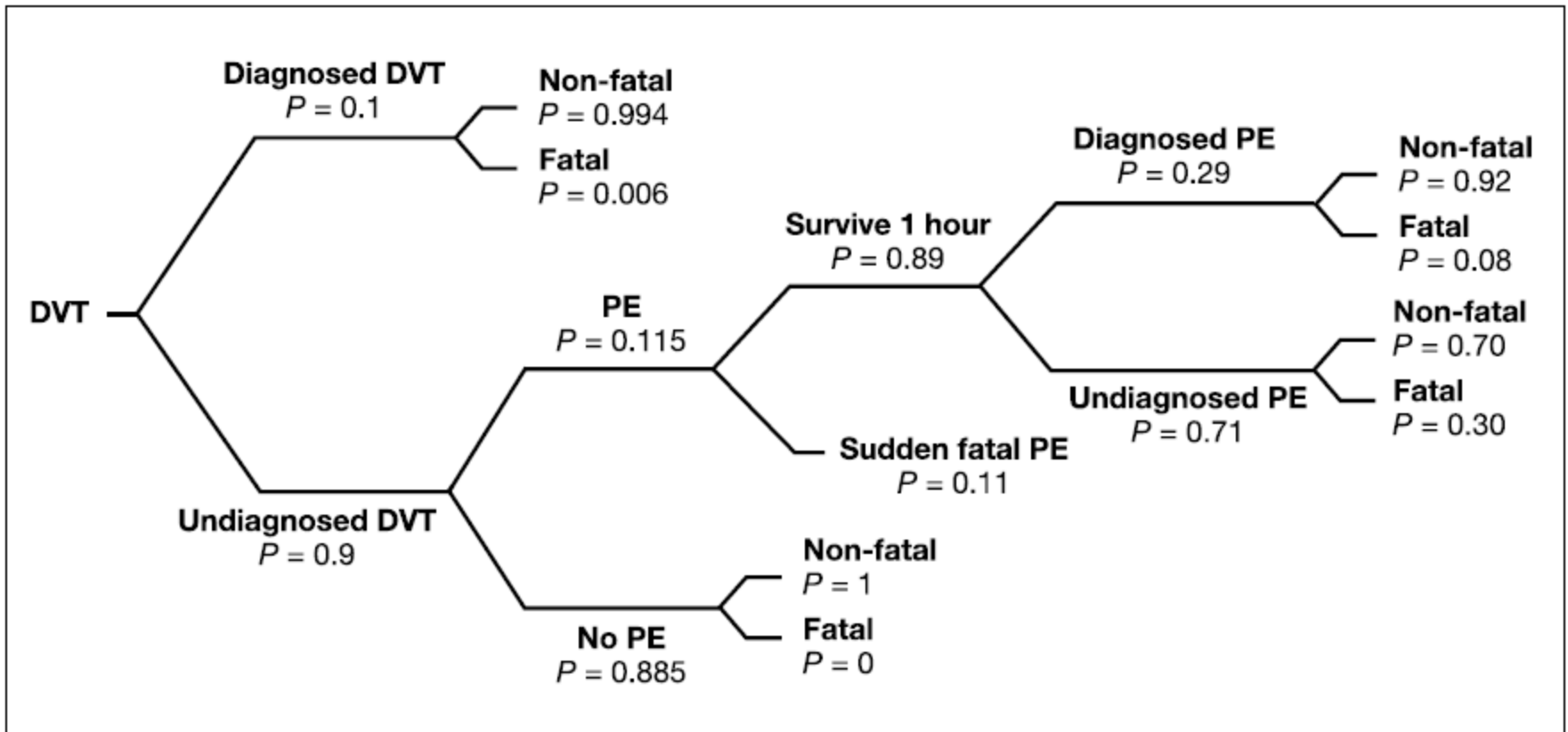
HELIOS Klinikum Krefeld

Blood Coagulation, Fibrinolysis and Cellular Haemostasis

Venous thromboembolism in Europe

The number of VTE events and associated morbidity and mortality

Alexander T. Cohen¹, Giancarlo Agnelli², Frederick A. Anderson³, Juan I. Arcelus⁴, David Bergqvist⁵, Josef G. Brecht⁶, Ian A. Greer⁷, John A. Heit⁸, Julia L. Hutchinson⁹, Ajay K. Kakkar¹⁰, Dominique Mottier¹¹, Emmanuel Oger¹¹, Meyer-Michel Samama¹², Michael Spannagl¹³



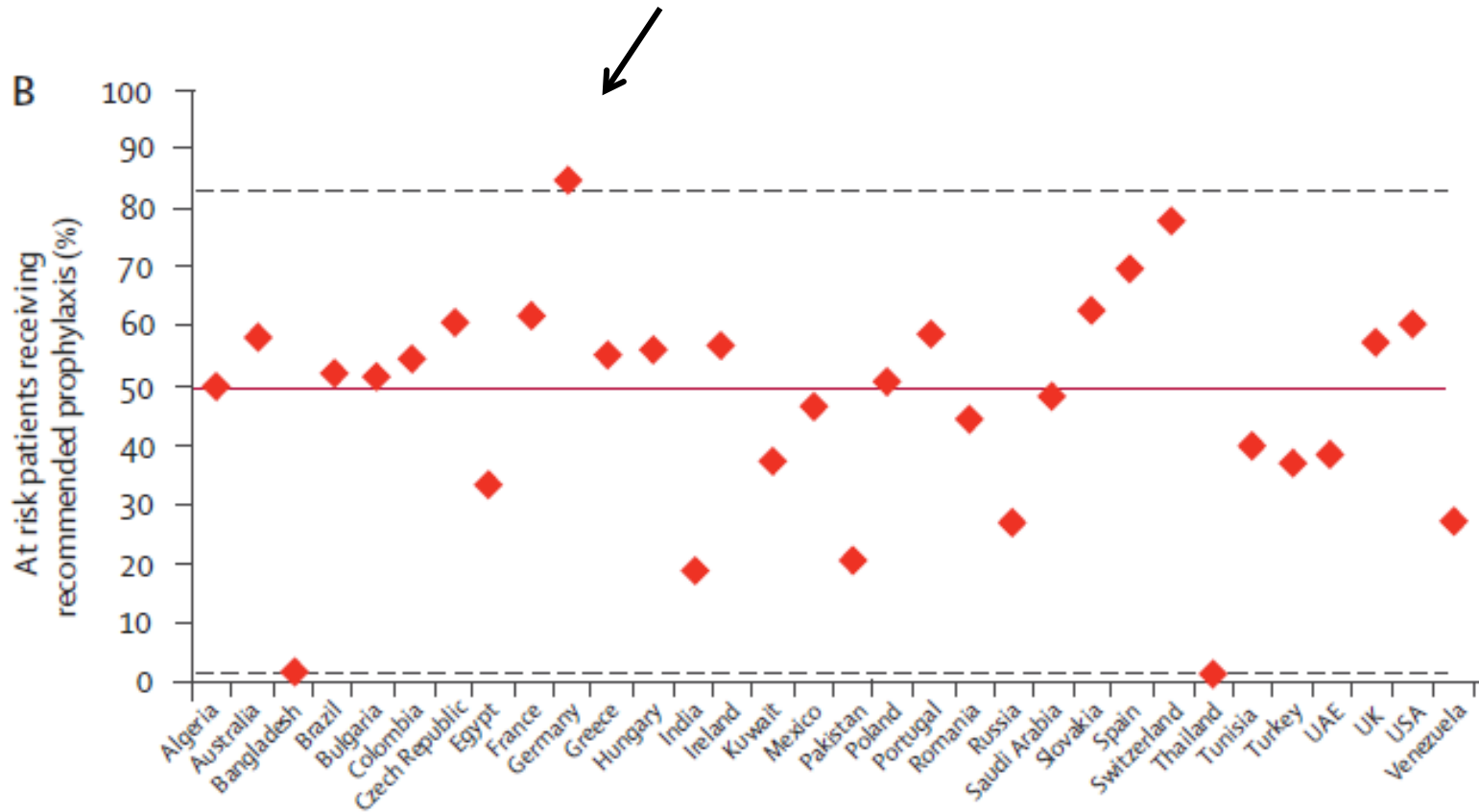
Discussion

The number of VTE-related deaths was estimated at 543,454 across the EU per annum, which is double the number of combined deaths due to AIDS (5,860), breast cancer (86,831), prostate cancer (63,636), and transport accidents (53,599) (40).

Discussion

This figure of 543,454 deaths is similar to that calculated from the most complete postmortem examination data set known, which estimates around 514,000 deaths from PE in the EU (42).

Lindblad B, Sternby NH, Bergqvist D. Incidence of venous thromboembolism verified by necropsy over 30 years. BMJ 1991; 302: 709–711.



Maßnahmen zur Prophylaxe

Basismaßnahmen der Thromboseprophylaxe

- Mobilisation
- Aktive und passive Bewegungsübungen (Muskelpumpe)
- Kreislauf- und Atemtherapie
- Regulation des Flüssigkeitshaushaltes
- Sorgfältig angepasste Antithrombosestrümpfe
- Kritische Indikationsstellung immobilisierender Maßnahmen, besonders des Sprung- und Kniegelenks und der Beckenregion

Janvrin SB, Davies G, Greenhalgh RM. Postoperative deep vein thrombosis caused by intravenous fluids during surgery. Br J Surg. 1980 Oct;67(10):690-3.

Abstract

Using a new method of measuring whole blood clotting time, we have confirmed the findings of others, that blood clots faster when diluted with saline.

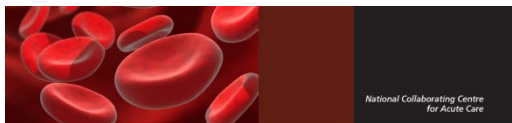
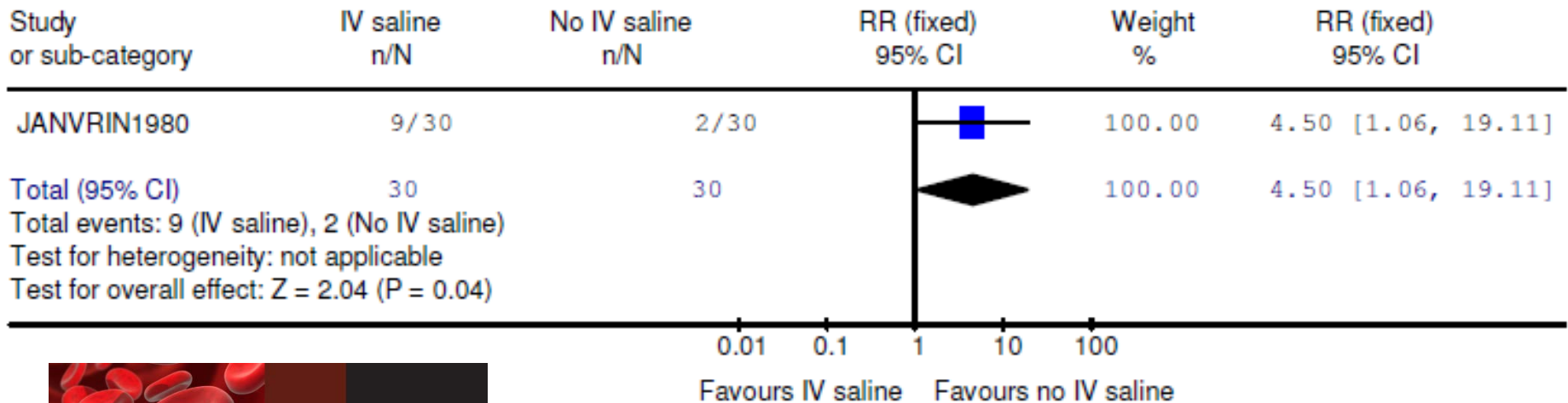
A prospective trial was designed to test the hypothesis that intravenous saline peroperatively causes hypercoagulation and increases the risk of venous thrombosis.

Sixty patients admitted for **routine laparotomy** were randomly allocated to either a group receiving intravenous fluids during or after operation (Wet), or a group receiving no intravenous fluids (Dry). The Wet patients became significantly more haemodilute and hypercoagulable than the Dry ($P < 0.001$), and these changes correlated.

A postoperative deep vein thrombosis occurred in 30 per cent of the Wet patients, but in only 7 per cent of the Dry ($P < 0.05$). The need for intravenous fluids during uncomplicated surgery is probably unproved, and their greater use may have contributed to the increasing prevalence of venous thromboembolism

Janvrin SB, Davies G, Greenhalgh RM. Postoperative deep vein thrombosis caused by intravenous fluids during surgery. Br J Surg. 1980 Oct;67(10):690-3.

Review: VTE Other prophylaxis
 Comparison: 01 Intravenous (IV) saline fluids vs no IV saline
 Outcome: 01 DVT





National Collaborating Centre
for Acute Care

Venous Thromboembolism

Reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in inpatients undergoing surgery

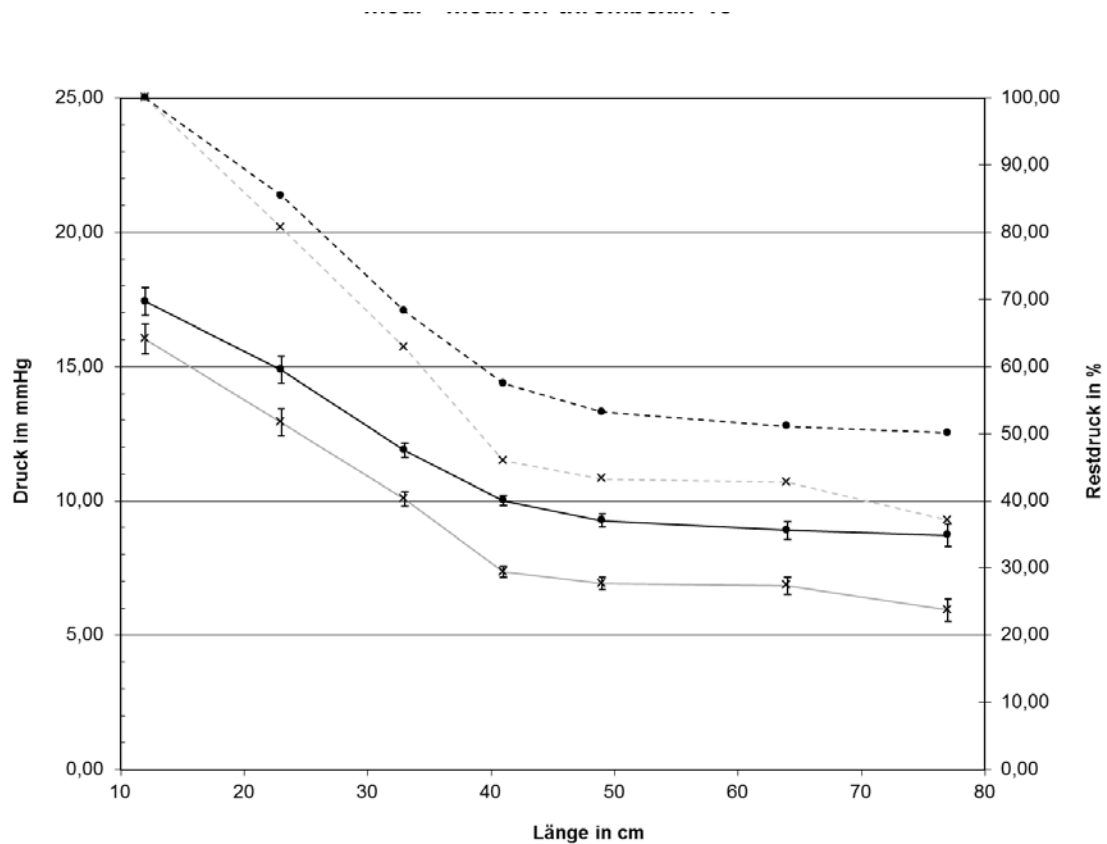


Effectiveness of thigh-length graduated compression stockings  
to reduce the risk of deep vein thrombosis after stroke
(CLOTS trial 1): a multicentre, randomised controlled trial

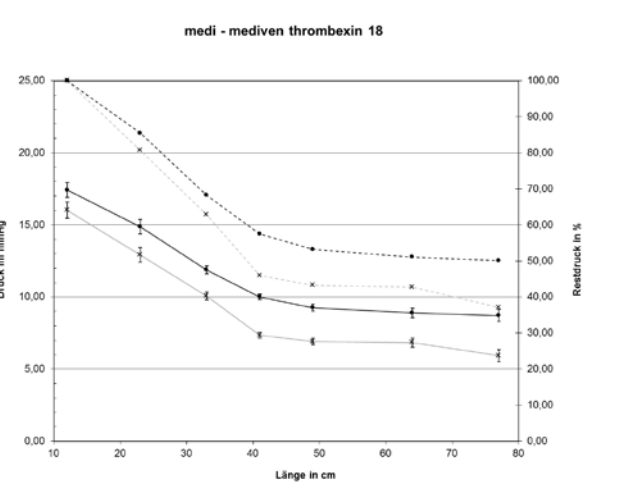
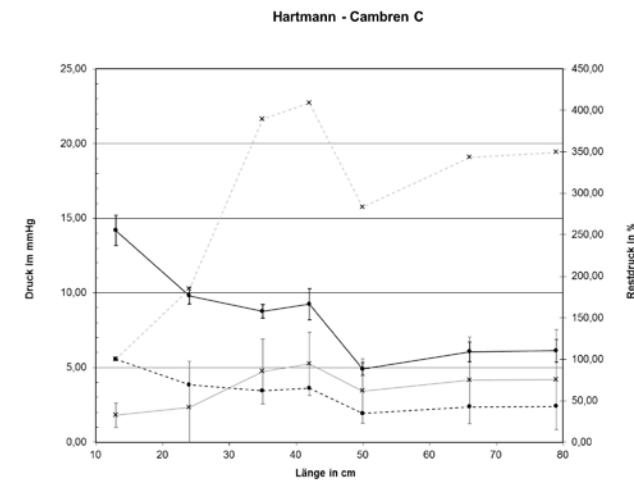
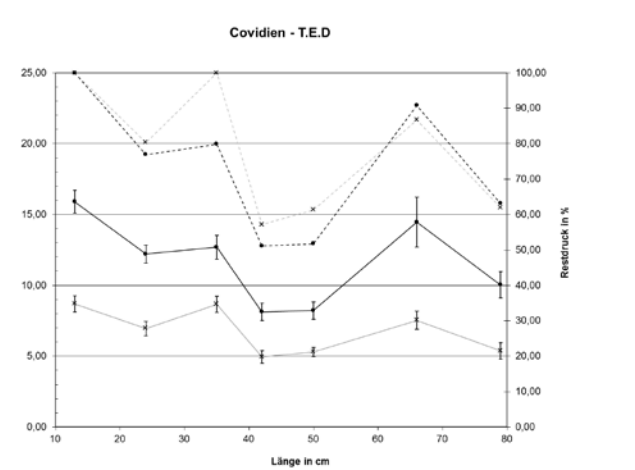
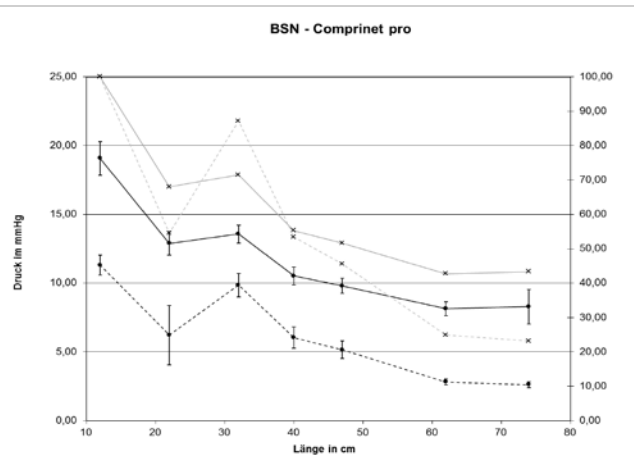
*The CLOTS Trials Collaboration**

Lancet. 2009 Jun 6;373(9679):1958-65

	Thigh-length GCS (n=1256)	Avoid GCS (n=1262)	Odds ratio (95% CI)
Primary outcome			
Proximal DVT	126 (10.0%)	133 (10.5%)	..
Alive and free of primary outcome	974 (77.5%)	1000 (79.2%)	..
Dead before any primary outcome	115 (9.2%)	101 (8.0%)	..
Missing	41 (3.3%)	28 (2.2%)	..
Unadjusted (dead and missing excluded)	0.97 (0.75-1.26)
Adjusted* (dead and missing excluded)	0.98 (0.76-1.27)



Werte für den Druck (DR) und den Restdruck (RD) für das jeweils angegeben minimale und maximale Umfangsmaß über den Verlauf der verschiedenen Meßpunkte.



Werte für den Druck (DR) und den Restdruck (RD) für das jeweils angegeben minimale und maximale Umfangsmaß über den Verlauf der verschiedenen Meßpunkte. Man beachte, dass das Diagramm für den Hartmann – Cambren C eine andere Skalierung des Restdruckes aufweist. Bei den Werten für den Druck (DR) ist die Standardabweichung eingetragen.



Risikoabschätzung

S3- Leitlinien: VTE – Risiko Operative Medizin

Gering

- Kleine operative Eingriffe
- Verletzung ohne oder mit geringem Weichteilschaden
- kein zusätzliches bzw. nur geringes dispositionelles Risiko, sonst Einstufung in höhere Risikokategorie

Mittel

- länger dauernde Operationen
- gelenkübergreifende Immobilisation der unteren Extremität im Hartverband
- Arthroskopisch assistierte Gelenkchirurgie der unteren Extremität
- kein zusätzliches bzw. nur geringes dispositionelles Risiko, sonst Einstufung in höhere Risikokategorie

Hoch

- größere Eingriffe in Bauch- und Beckenregion bei malignen Tumoren oder entzündlichen Erkrankungen
- Polytrauma, schwerere Verletzungen Wirbelsäule, Becken und/oder untere Extremität
- größere Eingriffe an Wirbelsäule, Becken, Hüft- oder Kniegelenk
- größere operative Eingriffe in Körperhöhlen der Brust-, Bauch- und/oder Beckenregion

S3- Leitlinien: VTE – Risiko nicht-chirurgischen Patienten

Gering	<ul style="list-style-type: none">• Infektion oder akut-entzündliche Erkrankung ohne Bettlägerigkeit• Zentralvenöse Katheter/Portkatheter• kein zusätzliches bzw. nur geringes dispositionelles Risiko, sonst Einstufung in höhere Risikokategorie
Mittel	<ul style="list-style-type: none">• Akute Herzinsuffizienz (NYHA III/IV)• Akut dekomp. schwere COPD ohne Beatmung• Infektion oder akut-entzündliche Erkrankung mit strikter Bettlägerigkeit• Stationär behandlungsbedürftige maligne Erkrankung• kein zusätzliches bzw. nur geringes dispositionelles Risiko, sonst Einstufung in höhere Risikokategorie
Hoch	<ul style="list-style-type: none">• Schlaganfall mit Beinparese• Akut dekompensierte, schwere COPD mit Beatmung• Sepsis• Schwer erkrankte Patienten mit intensivmedizinischer Behandlung

S3- Leitlinien: Dispositionelle Risikofaktoren	Relative Bedeutung
Frühere TVT/LE	hoch
Thrombophile Hämostasedefekte	artspezifisch gering bis hoch
Maligne Erkrankung**	mittel bis hoch *
Höheres Alter (über 60 J., Risikozunahme mit dem Alter)	mittel *
VTE bei Verwandten 1. Grades	mittel
Chronische Herzinsuffizienz, Z.n. Herzinfarkt **	mittel *
Übergewicht (BMI >30 kg/m²)	mittel *
Akute Infektionen/ entzündliche Erkrankungen mit Immobilisation ***	mittel *
Sexualhormonen (zur Kontrazeption, in der Postmenopause, zur Tumorbehandlung)	substanzspezifisch gering bis hoch
Schwangerschaft und Postpartalperiode	gering
Nephrotisches Syndrom	gering
Stark ausgeprägte Varikosis	gering

*stetige Risikowirkungsbeziehungen

**können auch als expositionelle Risikofaktoren auftreten

S3- Leitlinien

3.7 Besonderheiten der VTE-Prophylaxe in der ambulanten Medizin

- Die VTE-Prophylaxe in der ambulanten Medizin soll nach den gleichen Kriterien erfolgen wie die Prophylaxe im Krankenhaus.
↑↑



Prevention of VTE in Orthopedic Surgery Patients

2.1.1. In patients undergoing total hip arthroplasty (THA) or total knee arthroplasty (TKA), we recommend use of one of the following for a minimum of 10 to 14 days rather than no antithrombotic prophylaxis:

- low-molecular-weight heparin (LMWH), fondaparinux,
- apixaban, dabigatran, rivaroxaban,
- low-dose unfractionated heparin (LDUH),
- adjusted-dose vitamin K antagonist (VKA),
- aspirin (all Grade 1B) ,
- or an intermittent pneumatic compression device (IPCD) (Grade 1C)



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Prevention of VTE in Nonorthopedic Surgery Patients

3.6.1. For general and abdominal-pelvic surgery patients at **very low risk** for VTE (, 0.5%; Rogers score, 7; Caprini score, 0), we recommend that **no specific** pharmacologic (Grade 1B) or mechanical (Grade 2C) **prophylaxis** be used other than early ambulation.

3.6.2. For general and abdominal-pelvic surgery patients at **low risk** for VTE (1.5%; Rogers score, 7-10; Caprini score, 1-2), we suggest **mechanical prophylaxis**, preferably with intermittent pneumatic compression (IPC), over no prophylaxis (Grade 2C) .

Table 7—Caprini Risk Assessment Model

1 Point	2 Points	3 Points	5 Points
Age 41-60 y	Age 61-74 y	Age \geq 75 y	Stroke (< 1 mo)
Minor surgery	Arthroscopic surgery	History of VTE	Elective arthroplasty
BMI > 25 kg/m ²	Major open surgery (> 45 min)	Family history of VTE	Hip, pelvis, or leg fracture
Swollen legs	Laparoscopic surgery (> 45 min)	Factor V Leiden	Acute spinal cord injury (< 1 mo)
Varicose veins	Malignancy	Prothrombin 20210A	
Pregnancy or postpartum	Confined to bed (> 72 h)	Lupus anticoagulant	
History of unexplained or recurrent spontaneous abortion	Immobilizing plaster cast	Anticardiolipin antibodies	
Oral contraceptives or hormone replacement	Central venous access	Elevated serum homocysteine	
Sepsis (< 1 mo)		Heparin-induced thrombocytopenia	
Serious lung disease, including pneumonia (< 1 mo)		Other congenital or acquired thrombophilia	
Abnormal pulmonary function			
Acute myocardial infarction			
Congestive heart failure (< 1 mo)			
History of inflammatory bowel disease			
Medical patient at bed rest			



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Prevention of VTE in Nonorthopedic Surgery Patients

3.6.3. For general and abdominal-pelvic surgery patients at **moderate risk** for VTE (3.0%; Rogers score, . 10; Caprini score, 3-4) who are not at high risk for major bleeding complications, we suggest **low-molecular-weight heparin(LMWH) (Grade 2B)**, **low-dose unfractionated heparin (LDUH) (Grade 2B) , or mechanical prophylaxis**, preferably with IPC (Grade 2C) , over no prophylaxis.



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Prevention of VTE in Nonorthopedic Surgery Patients

3.6.5. For general and abdominal-pelvic surgery patients **at high risk** for VTE (6.0%; Caprini score, 5) who are not at high risk for major bleeding complications, we **recommend pharmacologic prophylaxis with LMWH (Grade 1B) or LDUH (Grade 1B)** over no prophylaxis. We suggest that mechanical prophylaxis with elastic stockings (ES) or IPC should be added to pharmacologic prophylaxis (Grade 2C) .



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Prevention of VTE in Nonsurgical Patients

2.3. For **acutely ill hospitalized medical** patients at increased risk of thrombosis, we recommend anticoagulant thromboprophylaxis with **LMWH, LDUH bid, LDUH tid, or fondaparinux** (Grade 1B) .

2.4. For **acutely ill hospitalized medical patients at low risk** of thrombosis, we recommend against the use of pharmacologic prophylaxis or mechanical prophylaxis (Grade 1B) .

2.8. In acutely ill hospitalized medical patients who receive an initial course of thromboprophylaxis, we **suggest against extending the duration of thromboprophylaxis beyond the period of patient immobilization or acute hospital stay** (Grade 2B) .

ORIGINAL PAPER

Venous thromboembolism in Germany: results of the GermAn VTE registry (GATE-registry)

K. Kröger,^{1,2} C. Moerchel,^{2,3} C. Bus,¹ M. Serban¹

 THE INTERNATIONAL JOURNAL OF
CLINICAL PRACTICE

 Editor's
Choice

		DVT	PE	DVT + PE	all	With heparin prophylaxis
		n (%)	n (%)	N (%)	n (%)	
Total		493	32	104	629	
All within a medical setting		204 (100) (71.3)	21 (100) (7.3)	61 (100) (21.3)	286 (100) (100)	80
Hospitalised because of	surgery	50 (24.5)	5 (23.8)	13 (21.3)	68 (23.8)	32 (47.1)
	acute medical illness	10 (4.9)	6 (28.6)	16 (26.2)	32 (11.2)	11 (34.4)
	for diagnostic reasons	1	1	2 (3.3)	4 (1.4)	-
	Other reasons	10 (4.9)	-	1	11 (3.8)	4 (36.7)
Hospitalized (total)						45 (56.3)
Out-patient treatment	surgery	27 (13.2)	2 (9.5)	2 (3.3)	31 (10.8)	17 (54.8)
	chemotherapy	13 (6.4)	1	4 (6.6)	18 (6.3)	1
	radiation	1		2 (3.3)	3 (1.1)	1
Out-patient treated (total)						19 (23.8)
Sick At home because	Recommended by the family doctor	30 (14.7)	3 (14.3)	7 (11.5)	40 (14.0)	11 (27.5)
	Infection and fever	12 (5.9)	6 (28.6)	15 (24.6)	33 (11.5)	1
	Sick at home (total)					12 (15.0)
others	Minor accident	51 (25.0)	1	3 (4.9)	55 (19.3)	11 (20.0)
	Back from a trip	4 (2.0)	1	2 (3.3)	7 (2.4)	1
	felt unfit for weeks	35 (17.2)	15 (71.4)	28 (45.9)	78 (27.3)	11 (14.1)
	Pregnancy delivery	3 -	- -	0 1	3 1	2 -
	Others (total)					24 (30.0)
Not within a medical setting		289 (100) (84.3)	11 (100) (3.2)	43 (100) (12.5)	343 (100) (100)	
Back from a trip		34 (11.8)	2 (18.2)	5 (11.6)	41 (12.0)	
None of the above		255 (88.2)	9 (81.8)	38 (88.4)	302 (88.0)	

	DVT	PE	DVT + PE	all
	n (%)	n (%)	n (%)	n (%)
All within a medical setting	204	21	61	286
Totally fit	47 (23.0)	1 (4.8)	11 (18.0)	59 (20.6)
Performed regular sport as usual	7 (3.4)	0	0	7 (2.4)
Was less mobile as usual	132 (64.7)	15 (71.4)	33 (54.1)	180 (62.9)
Lying down a lot	46 (22.5)	7 (33.3)	29 (47.5)	82 (28.7)
No answer	1 (0.5)	3 (14.3)	7 (11.5)	11 (3.8)
Not within a medical setting	289	11	43	343
Totally fit	234 (81.0)	7 (63.6)	27 (62.8)	268 (78.1)
Performed regular sport as usual	21 (7.3)	2 (18.2)	5 (11.6)	28 (8.2)
Was less mobile as usual	45 (15.6)	2 (18.2)	6 (14.0)	53 (15.5)
Lying down a lot	4 (1.4)	2 (18.2)	3 (7.0)	9 (2.6)
No answer	1 (0.3)	1 (9.1)	7 (16.3)	9 (2.6)

Prophylaxis	All within a medical setting
	n = 286
Doctors had informed about VTE Prophylaxis	89 (31.1%)
Specific recommendations were given	
to stay mobile	28 (9.8%)
to drink much	16 (5.6%)
to move the legs often daily	16 (5.6%)
to wear graded stockings	38 (13.3%)
to apply heparin	74 (25.9%)
Specific prophylaxis performed	
stayed mobile	22 (7.7%)
drunk much	17 (5.9%)
moved the legs often daily	20 (7.0%)
wore graded stockings	43 (15.0%)
applied heparin	93 (32.5%)
Platelet inhibitory drugs in routine medication (ASS, Clopidogrel)	45 (15.7%)

Year	Age-standardized death rate per 100,000	all Anticoagulants (in 1000 DDD)	Enoxaparin total (in 1000 DDD)	Enoxaparin per 1000 insured in DDD
2004	5.9283	298881.8	27071.1	385.1
2005	5.9412	340414.5	35578.4	504.8
2006	5.5240	367275.8	41247.1	586.7
2007	5.5672	393778.9	48859.5	695.0
2008	5.4160	423626.2	60553.4	862.0
2009	5.2416	440953.7	71313.9	1069.0
2010	4.8765	474136.7	83561.4	1193.5
2011	4.4876	513888.3	97276.5	1394.3
2012	4.2094	572888.0	106294.6	1524.7
2013	not published	630892.0 (incl.83686.9 DDD Rivaroxaban)	100085,4	1432.8

Variable	Effect estimate	Standard Error	p-Value
Intercept	7,3955	1,7074	0,0075
Anticoagulants	1,1551	0,7068	0,1631
Enoxaparin	-0,5107	0,2046	0,0548

Danke!

