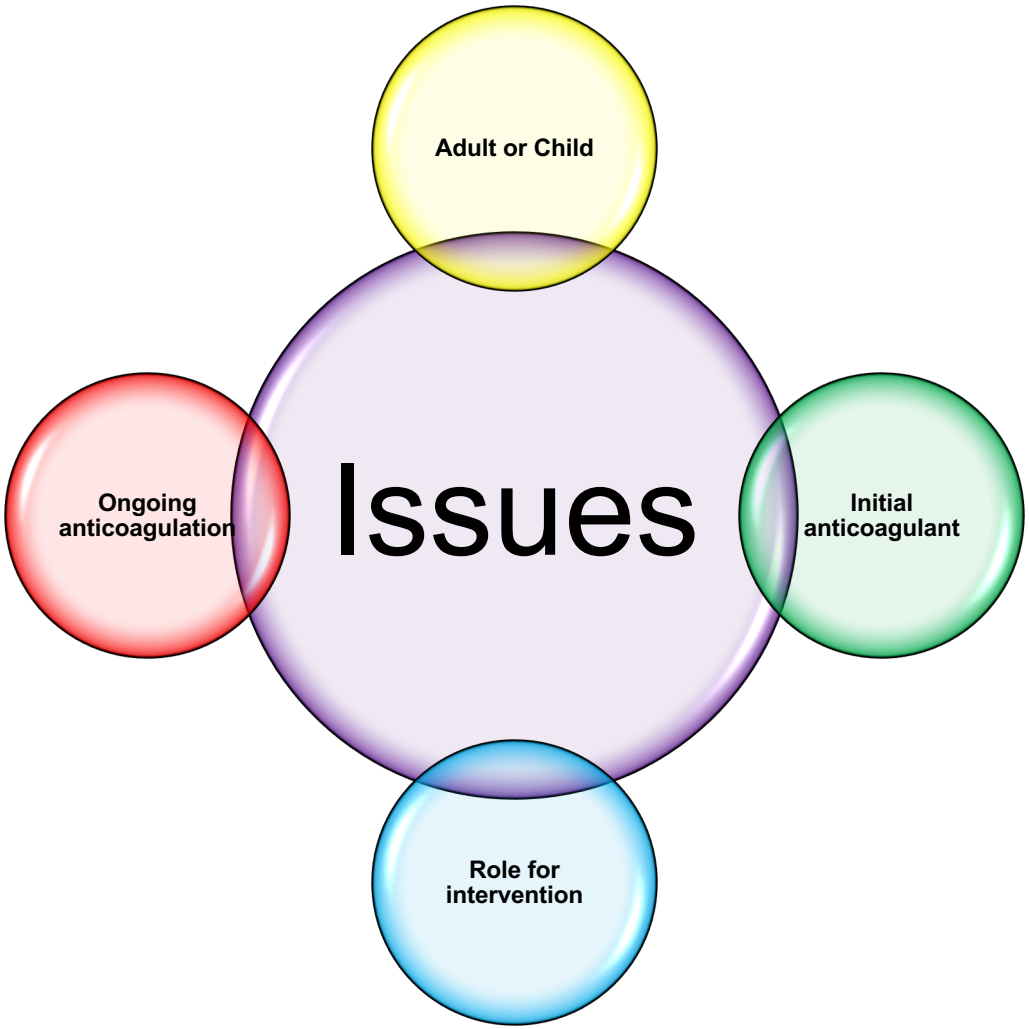
Guy's and St Thomas'
NHS Foundation Trust

Interactive VTE Case Studies

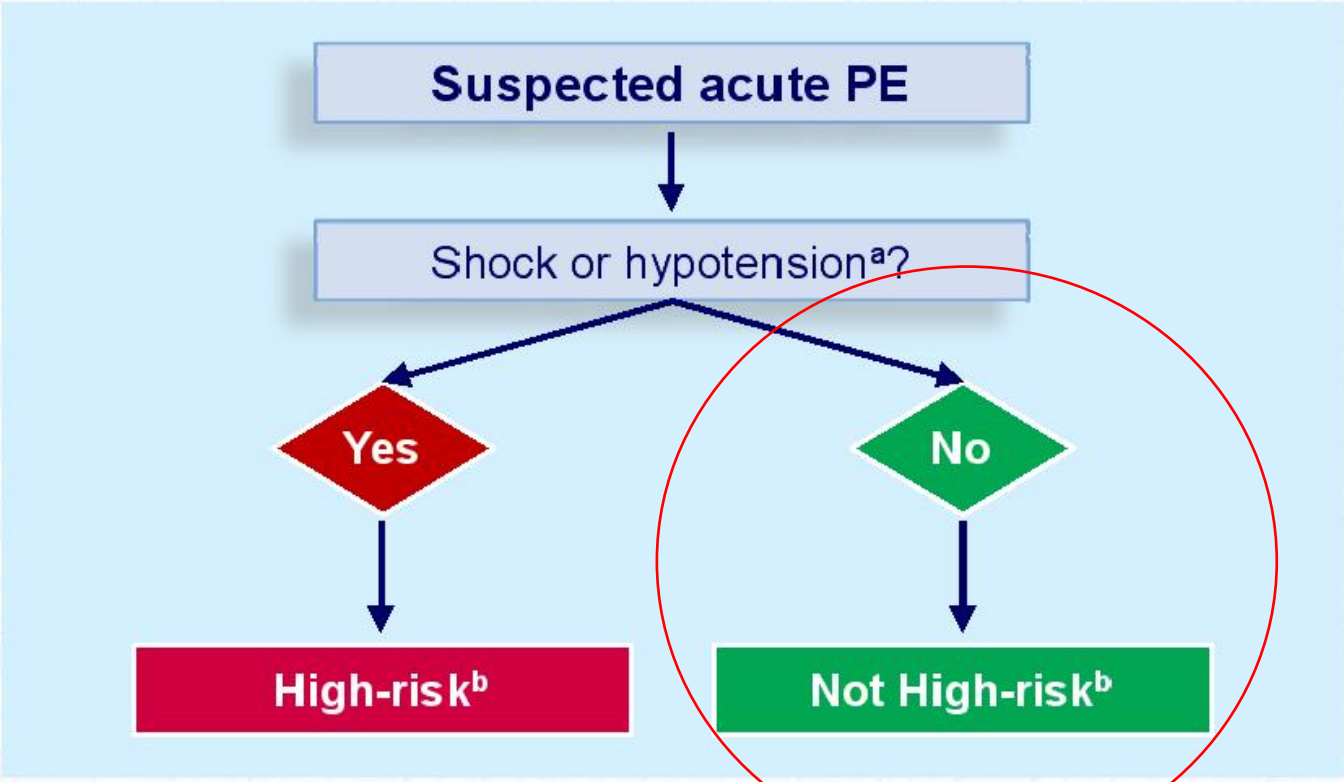
Maeve Crowley

Case 1.

- 16 year old girl
- Admitted with a 5 day history of dyspnoea associated with left sided chest pain
- D-dimer elevated - CTPA confirmed extensive bilateral PEs with features of R heart strain
- Trop 26, NT pro-BNP 5717
- Background – menorrhagia – had recently commenced COCP; anxiety


Adult or Child
Ongoing anticoagulation
Issues
Initial anticoagulant
Role for intervention

Initial risk stratification of acute PE



[a] Defined as systolic blood pressure <90 mmHg, or a systolic pressure drop by ≥40 mmHg, for >15 minutes, if not caused by new-onset arrhythmia, hypovolaemia, or sepsis.
[b] Based on the estimated PE-related in-hospital or 30-day mortality.

European Heart Journal (2014):doi:10.1093/eurheartj/ehu283

⊞ Temp1 Central											
⊞ Temp2 Peripheral	Tym:36.0		Tym:35.5			Tym:36.8			Tym:36.5		Tym:36.0
HR	120	118	113	105	101	103	117	113	101	115	112
Cardiac Rhythm	ST	ST	ST	ST	ST	ST	ST	ST	ST	ST	ST
Cardiac Ectopics	Rare VEs	None	None	None	None		None	None	None	None	None
⊞ ABP	119 / 73	124 / 73	113 / 72	94 / 66	104 / 69	117 / 74	120 / 74	113 / 67	117 / 71	124 / 73	112 / 72
ABP Mean	88	88	85	77	83	89	89	82	86	89	85
CVP											
Resp Rate Monitor	20	27	22	22	21	23	18	21	20	20	23
SpO2	96	96	97	96	97	97	97	98	99	98	96
PAR Score											
Capillary Refill	<3 secs								<3 secs		
⊞ Limb Warmth R+L	Warm/Wa...	Cold/Cold							Cool/Cool		
⊞ Pedal R+L	Yes/Yes	Yes/Yes							Yes/Yes		
⊞ Radial R+L	Yes/Yes	Yes/Yes							Yes/Yes		

B:PESI Scoring system	Points assigned
Age	+1 per year
Male sex	+10
Active cancer	+30
Heart failure	+10
Chronic lung disease	+10
Pulse >110bpm	+20
Syst BP<100 mmHg	+30
Resp rate >30/min	+20

Low risk PESI (I)

SaO2 if known resp disease	
PESI score: **Low risk PESI I, II** **High risk PESI III, IV or V**	**I <66** **II 67-85** **III 86-105** **IV 106-125** **V >125**
**** PESI score: The pulmonary embolism severity index (PESI) score is a clinical prediction tool to risk stratify patients with PE.***	

Classification of early mortality risk

Early mortality risk		Risk parameters and scores			
		Shock or hypotension	PESI Class III-V or sPESI ≥1	Signs of RV dysfunction on an imaging test	Cardiac laboratory biomarkers
High		+	(+)	+	(+)
Intermediate	Intermediate-high	–	+	Both positive	
	Intermediate-low	–	+	Either one (or none) positive	
Low		–	–	Assessment optional; if assesed, both negative	

European Heart Journal (2014):doi:10.1093/eurheartj/ehu283

Acute phase treatment

Recommendations	Class	Level
PE without shock or hypotension (intermediate or low risk)		
Reperfusion treatment		
Routine use of primary systemic thrombolysis is not recommended in patients without shock or hypotension.	III	B
Close monitoring is recommended in patients with intermediate-high risk PE to permit early detection of haemodynamic decompensation and timely initiation of rescue reperfusion therapy.	I	B
Thrombolytic therapy should be considered for patients with intermediate-high-risk PE and clinical signs of haemodynamic decompensation.	IIa	B
Surgical pulmonary embolectomy may be considered in intermediate-high-risk patients if the anticipated risk of bleeding under thrombolytic treatment is high.	IIb	C
Percutaneous catheter-directed treatment may be considered in intermediate-high-risk patients if the anticipated risk of bleeding under thrombolytic treatment is high.	IIb	B

European Heart Journal (2014):doi:10.1093/eurheartj/ehu283

Adult or Child?

- Patient dependent factors
- Physiologically an adult
- Signposting – deferred to mother, did not want to be involved in decision making, OCP for menorrhagia not contraception, embarrassed when discussed anticoagulants in the setting of pregnancy
- Found adult critical care difficult
- Very distressed by venipuncture

GMC guidance

- The law assumes that by the age of 16 years, young people are able to make decisions about their own care, although there are national differences relating to consent to investigations and treatment.

- If a child or young person with capacity refuses to give consent, you must respect their decision.

Journal of Thrombosis and Haemostasis, 8: 1509–1514 DOI: 10.1111/j.1538-7836.2010.03888.x

ORIGINAL ARTICLE

The validation and reproducibility of the pulmonary embolism severity index

C. M. CHAN, C. WOODS and A. F. SHORR
Pulmonary & Critical Care Medicine, Washington Hospital Center, Washington, DC, USA

To cite this article: Chan CM, Woods C, Shorr AF. The validation and reproducibility of the pulmonary embolism severity index. *J Thromb Haemost* 2010; 8: 1509–14.

Summary. *Background*: Rapid, accurate risk stratification is paramount in managing patients with acute pulmonary embolism (PE). The PE Severity Index (PESI) is a simple tool that risk stratifies patients with acute PE. *Objectives*: We sought to validate the PESI as a predictor of short- and intermediate-term mortality and to determine the inter-rater variability. *Patients/Methods*: We retrospectively identified all patients with acute PE between October 2007 and February 2009. Two clinicians reviewed charts and independently scored PESI blinded to each other and to patient outcomes. Thirty- and 90-day mortality served as study endpoints and vital status was assessed via the Social Security Death Index. To facilitate analyses, raw PESI score was converted into risk class groups (I–V) and further dichotomized into low risk (I–II) vs. high risk (III–V) groups. Intraclass correlation and the kappa statistic were used to determine inter-rater variability. *Results*: The cohort included 302 subjects (mean age, 59.7 ± 17.2 years; 44% male). All-cause 30- and 90-day mortalities were 3.0% and 4.0%, respectively. The mortality rate increased as raw PESI score increased. Risk of death correlated with risk class ($P < 0.001$). There were no deaths in risk classes I–III, but 30- and 90-day mortality for class V were 9.2% and 10.5%, respectively. Overall, mean PESI scores were similar between observers: 103.3 ± 39.3 and 96.5 ± 37.6 (P = NS). The inter-rater variability was good (kappa = 0.69; $P < 0.0001$). *Conclusions*: The PESI correlates with 30- and 90-day mortality. It represents a reproducible scoring tool to risk stratify patients with acute PE.

Keywords: inter-rater variability, mortality, pulmonary embolism, severity index.

Correspondence: Chee M. Chan, Washington Hospital Center, 110 Irving Street, NW #2B-39, Washington, DC 20010, USA.
Tel.: +1 202 877 7856; fax: +1 202 291 0386.
E-mail: chee262@hotmail.com

Received 14 January 2010, accepted 5 April 2010

Introduction

Pulmonary embolism (PE) remains a common and burdensome condition. More than 650 000 PEs occur annually in the US and result in substantial morbidity, mortality and cost [1]. As a syndrome, PE represents a diagnostic challenge and may be initially overlooked. Similarly, the non-specific nature of the symptoms related to PE can lead to a delay in diagnosis. Beyond simply confirming the diagnosis, the physician must decide what setting is most appropriate for initial management (e.g. ward, ICU, or home) and determine if aggressive interventions such as thrombolytics are required. In many other complicated disease states, such as pneumonia or gastrointestinal bleeding, investigators have developed and validated formal risk stratification tools to identify subjects who may face a poor outcome [2,3]. For PE, such clinical scoring tools are only now being developed.

Along with the creation of risk stratification strategies in PE, recent non-randomized clinical trials suggest that select patients with non-massive PE can be safely treated with subcutaneous anticoagulants in an outpatient setting [4–8]. Further, in a randomized clinical trial where patients with acute PE at low risk of death were randomized to early discharge and outpatient management compared with inpatient management, the rate of complications did not differ between groups [9]. With proper education and appropriate follow-up, these analyses indicate that outpatient management of PE is possible. Given the expense associated with inpatient hospitalization, the option to safely triage patients with PE to home management represents a means of significantly reducing health care costs [10]. However, appropriate patient selection is crucial, and physicians require a reliable and reproducible means of determining if a patient is a suitable candidate for this approach.

The pulmonary embolism severity index (PESI) was developed by Aujesky *et al.* [11] as a possible clinical prediction rule for 30-day mortality. The PESI consists of 11 clinical variables that the physician can quickly assess at the time of diagnosis: two demographic characteristics, three medical comorbidities and six clinical findings (Table 1). Moreover, the PESI requires neither imaging technology, such as an echocardiogram, nor laboratory biomarkers (i.e. troponin). Using this scoring

Table 1 Pulmonary embolism severity index

Predictors	Points assigned
Demographic characteristics	
Age, in years	Age, in years
Male sex	+ 10
Comorbid conditions	
Cancer	+ 30
Heart failure	+ 10
Chronic lung disease	+ 10
Clinical findings	
Pulse ≥ 110 beats/min	+ 20
Systolic blood pressure < 100 mmHg	+ 30
Respiratory rate ≥ 30 breaths/min	+ 20
Temperature < 36 °C	+ 20
Altered mental status*	+ 60
Arterial oxygen saturation < 90%†	+ 20

*Defined as disorientation, lethargy, stupor or coma. †With or without use of supplemental oxygenation.

system, Aujesky *et al.* have demonstrated that patients can be stratified into one of five risk classes (I–V), where the mortality rate increases with increasing class stratification. For example, 30-day mortality is estimated at 1.1% for those classified into class I, but 24.5% for those in class V. In a separate study, Donze *et al.* [12] found that 90-day mortality is 0% for those in class I and as high as 17.9% for class V patients. Thus, the PESI may serve as a potential tool for predicting mortality in patients with acute PE and, in turn, help identify low-risk patients who may be candidates for outpatient management. However, in order for a test to be clinically useful, it must be accurate, reproducible, reliable and easy to use.

We hypothesized that PESI is an accurate and reproducible tool for risk stratification in acute PE. We also theorized that PESI reliably correlates with mortality. To test our hypothesis, we conducted a retrospective analysis of all consecutive patients diagnosed with acute PE at our hospital in order to assess how the PESI correlated with mortality and to determine the inter-observer variability in the calculation of the PESI.

Methods

Subjects and definitions

Daily, we identified adult patients (age > 18 years) diagnosed the day prior with acute PE. We conducted the study between October 2007 and February 2009. All patients with a newly diagnosed PE were eligible for enrollment. Subjects were excluded if they had an expected survival of < 30 days due to other medical diseases (i.e. terminal illness such as metastatic cancer or critically ill with transition to comfort care within 72 h of admission). Patients who had multiple admissions for acute PE during this time frame were only enrolled during their first episode. The diagnosis of acute PE was made using objective criteria: computed tomography (CT) of the chest with PE protocol, high probability ventilation perfusion (V/Q) scintigraphy, pulmonary angiogram, or magnetic resonance angiogram (MRA) of the chest. Management of patients was left to the discretion of the primary physician without influence by the research team. Standard treatment for hemodynamically stable acute PE at our institution consists of immediate administration of a full-dose anticoagulant [i.e. unfractionated heparin (UFH), low-molecular-weight heparin (LMWH)] or placement of an inferior vena cava (IVC) filter if anticoagulation is contraindicated. In those who present with or develop hemodynamic instability due to their acute PE, thrombolytic therapy is administered after carefully considering the risks associated with chemical thrombolysis. In general, the decision to use thrombolytic therapy is made by an intensivist. This study was approved by the institutional review board; informed consent was not required.

Endpoints

All-cause 30- and 90-day mortalities served as primary endpoints. Once identified, charts were reviewed by two physicians independently (C. M. C, C. W.) and each calculated the PESI score. The raw PESI scores calculated by one investigator (C. M. C.) were utilized for the evaluation of mortality. We used the Social Security Death Index to determine death status at the various time points of interest.

The secondary endpoint was inter-observer variability in scoring PESI. The two physician observers calculated their respective scores blinded to the impressions of the other scorer. For outpatients either directly admitted to the hospital or who were diagnosed in the Emergency Department, clinical findings available at the time of scoring, both before and just after diagnosis of PE, were used to score PESI. For inpatients diagnosed with PE, clinical findings recorded during the 24 h prior to the diagnosis of PE were included.

Raw PESI scores were converted into risk class (I–V), and then further dichotomized to low-risk (class I–II) and high-risk (class III–V) groups (Table 2). In addition to collecting baseline demographic data, all-cause 30- and 90-day mortalities were also assessed.

Statistics

Using an α of 0.05 and a β of 0.20, a sample size calculation was performed. From prior studies, the estimated 90-day mortality from submassive PE is approximately 20% while that for non-massive PE is 3%. Thus, the sample size necessary for this study was 44 patients per group, and a minimal overall sample size of 220 patients.

Table 2 Class stratification and dichotomization of PESI score.

PESI score	Class	Low vs. high risk
≤ 65	I	Low
66–85	II	Low
86–105	III	High
106–125	IV	High
> 125	V	High

Choice of anticoagulant

Therapy	Advantages	Disadvantages
Unfractionated heparin (UFH)	• Short half-life • Reversal agent available	• Continuous intravenous infusion • Unable to administer outside of medical setting • Possible development of heparin-induced thrombocytopenia (HIT) • Frequent monitoring needed • Risk of bleeding
Low molecular weight heparin	• Easy to administer • Reversal agent available	• Effectiveness uncertain in obese patients • Possible pain with administration • Difficult to achieve therapeutic levels in infants • Possible development of HIT (less than UFH) • Risk of bleeding
Warfarin	• Oral • Able to monitor therapeutic level • Reversible	• Frequent monitoring • Difficult to maintain in therapeutic window in children • Multiple drug/food interactions • Risk of bleeding
Direct oral anticoagulant	• Oral • No frequent blood draws	• No way to monitor • Few reversal agents • Not approved for patients <18 years • Risk of bleeding

Pulmonary Embolism in Children

*Ahmar Urooj Zaidi†, Kelley K. Hutchins† and Madhvi Rajpurkar**

Division of Hematology Oncology, Carman and Ann Adams Department of Pediatrics, Wayne State University School of Medicine, Children's Hospital of Michigan, Detroit, MI, United States

- AMPLIFY VTE – 18 or older
- EINSTEIN VTE – ‘they were of legal age for consent’; Rivaroxaban group 55.8±16.4, Control group 56.4±16.3
- HOKUSAI VTE – 18 or older
- RECOVER – 18 or older

Journal of Thrombosis and Haemostasis, **15**: 2147–2157 DOI: 10.1111/jth.13847

ORIGINAL ARTICLE

Phase IIa study of dabigatran etexilate in children with venous thrombosis: pharmacokinetics, safety, and tolerability

J. M. L. HALTON,* M. ALBISETTI,† B. BISS,‡ L. BOMGAARS,§ M. BRUECKMANN,¶** S. GROPPER,¶ R. HARPER,†† F. HUANG,‡‡ M. LUCIANI,§§ H. MAAS,¶¶ I. TARTAKOVSKY¶ and L. G. MITCHELL***

*Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, Ontario, Canada; †Hematology Department, University Children's Hospital, Zürich, Switzerland; ‡Clinical Development, Boehringer Ingelheim RCV, Vienna, Austria; §Texas Children's Cancer Center, Baylor College of Medicine, Houston, TX, USA; ¶Clinical Development and Medical Affairs, Boehringer Ingelheim Pharma, Ingelheim; **Faculty of Medicine Mannheim, University of Heidelberg, Mannheim, Germany; ††Clinical Operations, Boehringer Ingelheim, Bracknell, UK; ‡‡Translational Medicine and Clinical Pharmacology, Boehringer Ingelheim Pharmaceuticals, Ridgefield, CT, USA; §§OncoHematology Department, Bambino Gesù Children's Hospital, Rome, Italy; ¶¶Translational Medicine and Clinical Pharmacology, Boehringer Ingelheim Pharma, Biberach, Germany; and ***University of Alberta, Edmonton, Alberta, Canada*

To cite this article: Halton JML, Albisetti M, Biss B, Bomgaars L, Brueckmann M, Gropper S, Harper R, Huang F, Luciani M, Maas H, Tartakovsky I, Mitchell LG. Phase IIa study of dabigatran etexilate in children with venous thrombosis: pharmacokinetics, safety, and tolerability. *J Thromb Haemost* 2017; **15**: 2147–57.

Essentials

- Dabigatran etexilate may provide a new treatment option for pediatric venous thromboembolism.
- Children aged 1 to < 12 years were given dabigatran etexilate in an open-label, single-arm study.
- The pharmacokinetic–pharmacodynamic relationship was similar to that seen in adult patients.
- There were no serious adverse events, bleeding events or recurrent venous thromboembolism.

Summary. *Background:* The current standard-of-care treatments for pediatric venous thromboembolism (VTE) have limitations. Dabigatran etexilate (DE), a direct thrombin inhibitor, may offer an alternative therapeutic option. *Objectives:* To assess the pharmacokinetics, pharmacodynamics, safety, and tolerability of a DE oral liquid formulation (OLF) in pediatric patients with VTE. *Patients/Methods:* Patients who had completed planned treatment with low molecular weight heparin or oral anticoagulants for VTE were enrolled in two age groups (2 to < 12 years and 1 to < 2 years), and received a DE OLF based on an age-adjusted and weight-adjusted nomogram. Originally, patients were to receive a DE OLF twice daily for 3 days, but the protocol was amended to a single dose on day 1. The primary endpoints were pharmacokinetics/pharmacodynamics-related: plasma concentrations of DE and its metabolites; activated partial thromboplastin time (APTT), ecarin clotting time (ECT), and dilute thrombin time (dTT); and pharmacokinetic (PK)–pharmacodynamic (PD) correlation. Safety endpoints included incidence rates of bleeding events and all other adverse events (AEs). *Results:* Eighteen patients entered the study and received the DE OLF (an exposure equivalent to a dose of 150 mg twice daily in adults). The projected steady-state dabigatran trough concentrations were largely comparable between pediatric patients and adults. The PK/PD relationship was linear for ECT and dTT, and non-linear for APTT. No serious or severe AEs, bleeding events, or recurrent VTEs were reported. Mild AEs were reported in three patients in the single-dose group (screening period) and in one patient in the multiple-dose group (on-treatment period). *Conclusion:* The current study supports the further evaluation of DE OLFs in pediatric patients with VTE.

Keywords: anticoagulants; dabigatran; direct thrombin inhibitors; pediatrics; venous thromboembolism.

What actually happened

- Admitted to critical care bed
- Initial anticoagulation with UFH – to facilitate intervention if she deteriorated
- Improved so no intervention
- Transitioned to apixaban (menorrhagia)
- NT pro-BNP and troponin normalized; VQ at 3/12 no residual PE

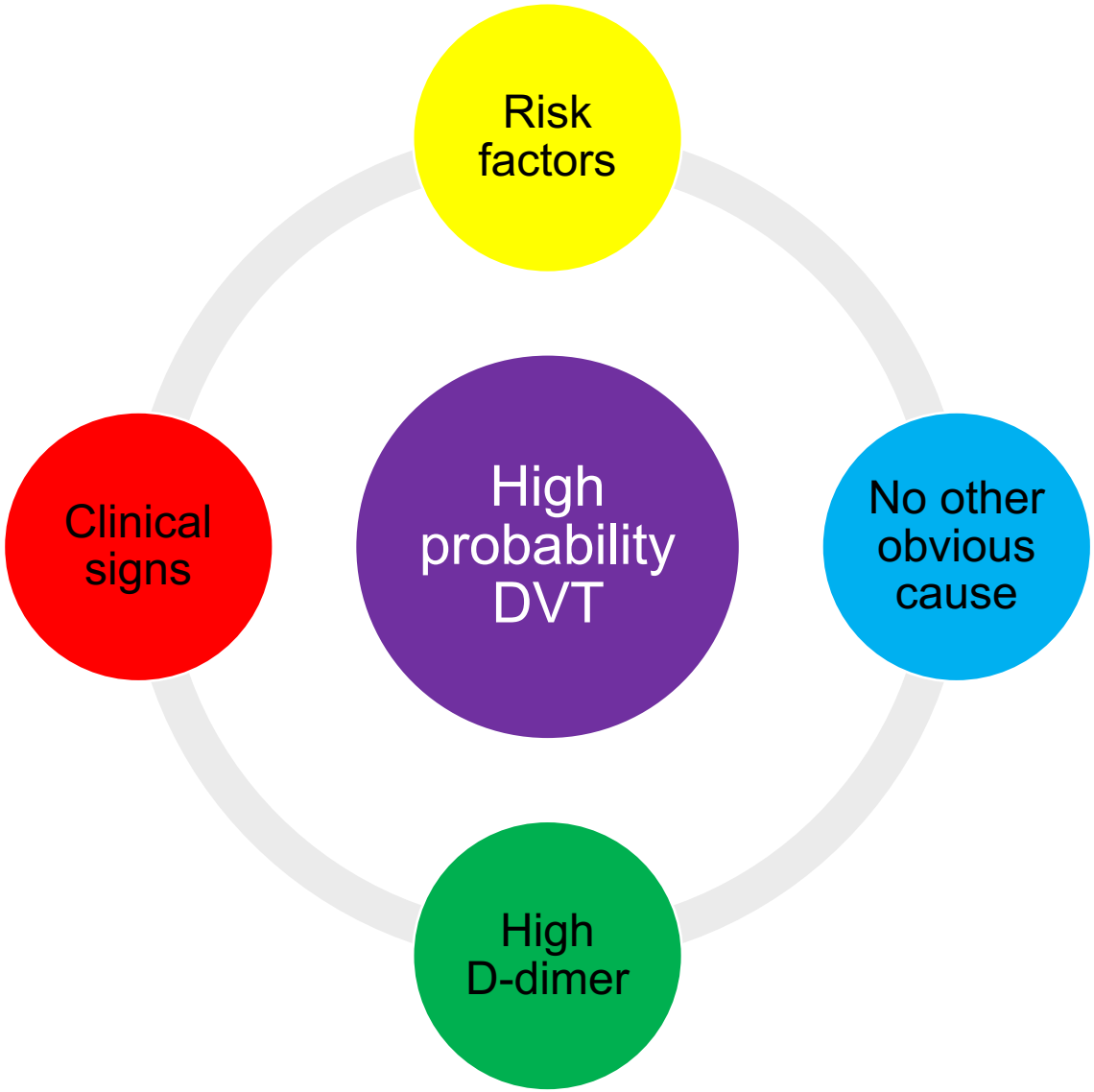
- Back at school and participating in normal activities

- Counselled regarding future contraceptive options/pregnancy

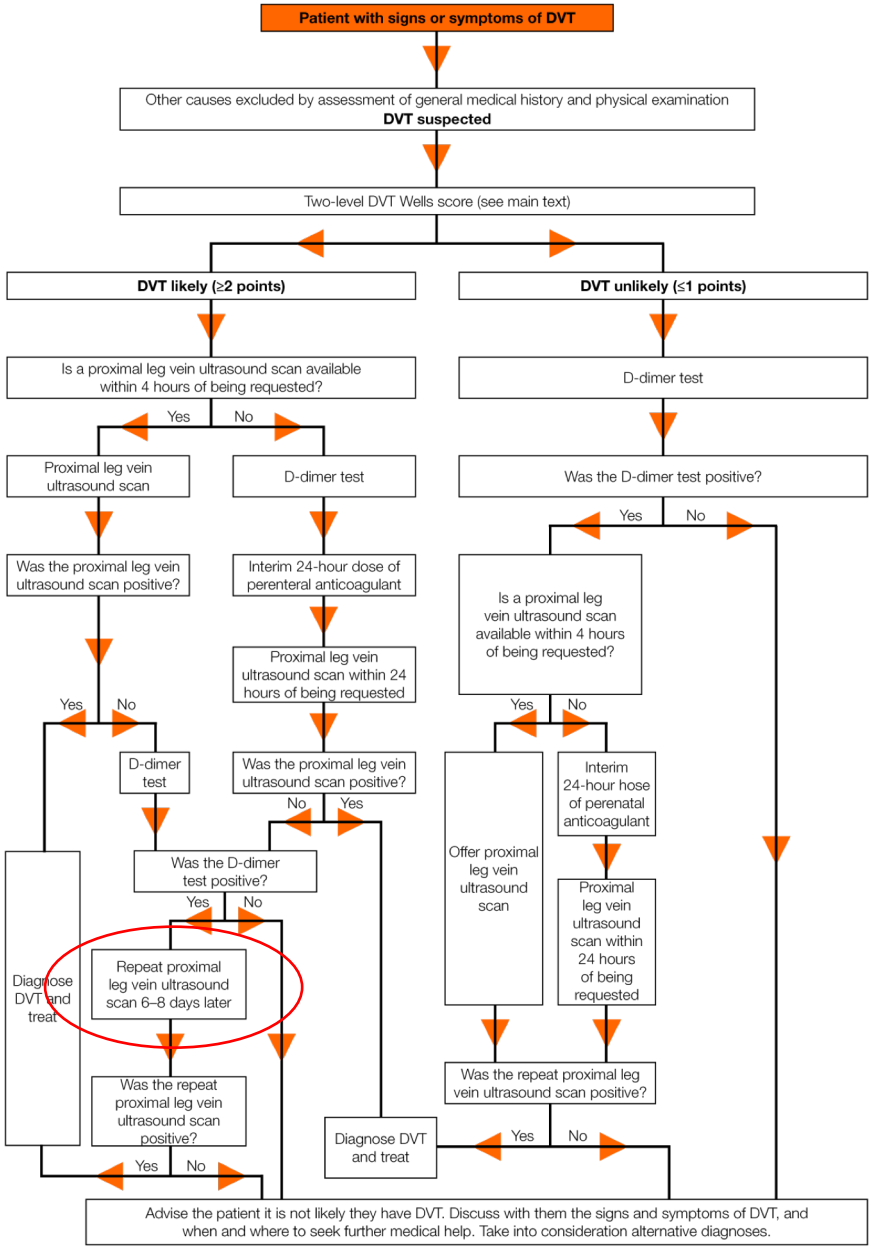
Case 2.

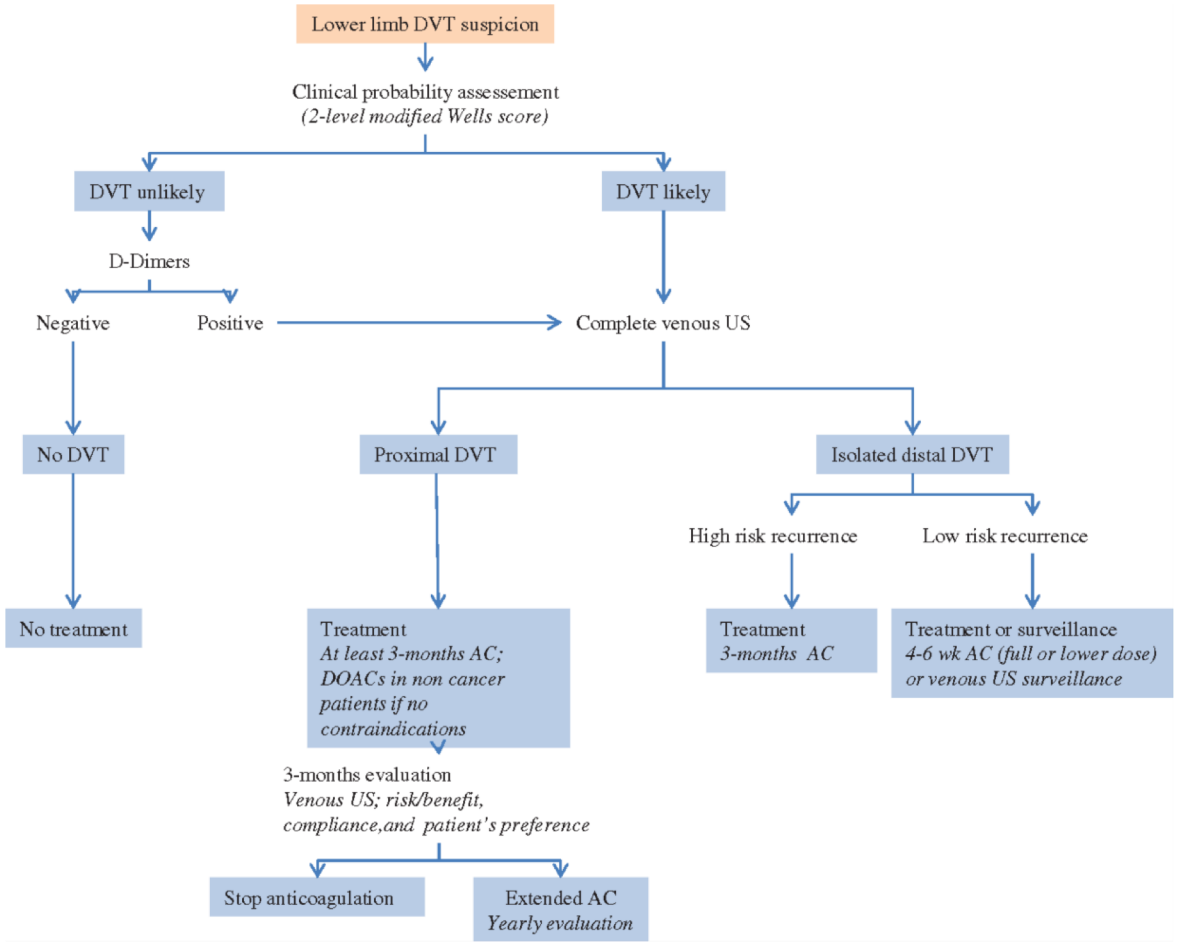
- 40 year old man with acute onset right leg swelling and pain.
- R leg 10cm bigger than L leg, pulses normal.
- RFs for VTE – recent LH flight (Australia) and gastroenteritis.
- Hx – previous apendicectomy (2015) and asthma.
- D-dimers 11.86 (NR 0-0.55 mg/L FEU).

- Doppler: *'The CFV, SFV, and popliteal vein are patent and compressible with wall to wall colour Doppler flow. The external iliac vein appears patent and compressible where visualised. In the calf the PTV, ATV, and peroneal veins are patent on augmentation. Impression: No evidence of a right leg DVT.*


Risk factors
Clinical signs
High probability DVT
No other obvious cause
High D-dimer

NICE


Patient with signs or symptoms of DVT
Other causes excluded by assessment of general medical history and physical examination
DVT suspected
Two-level DVT Wells score (see main text)
DVT likely (≥2 points)
DVT unlikely (≤1 points)
Is a proximal leg vein ultrasound scan available within 4 hours of being requested?
Yes
No
Proximal leg vein ultrasound scan
Was the proximal leg vein ultrasound scan positive?
Yes
No
D-dimer test
Was the D-dimer test positive?
Yes
No
Repeat proximal leg vein ultrasound scan 6–8 days later
Was the repeat proximal leg vein ultrasound scan positive?
Yes
No
Diagnose DVT and treat
D-dimer test
Interim 24-hour dose of perenteral anticoagulant
Proximal leg vein ultrasound scan within 24 hours of being requested
Was the proximal leg vein ultrasound scan positive?
No
Yes
Was the D-dimer test positive?
Yes
No
Diagnose DVT and treat
D-dimer test
Is a proximal leg vein ultrasound scan available within 4 hours of being requested?
Yes
No
Offer proximal leg vein ultrasound scan
Interim 24-hour hose of perenatal anticoagulant
Proximal leg vein ultrasound scan within 24 hours of being requested
Was the repeat proximal leg vein ultrasound scan positive?
Yes
No
Advise the patient it is not likely they have DVT. Discuss with them the signs and symptoms of DVT, and when and where to seek further medical help. Take into consideration alternative diagnoses.



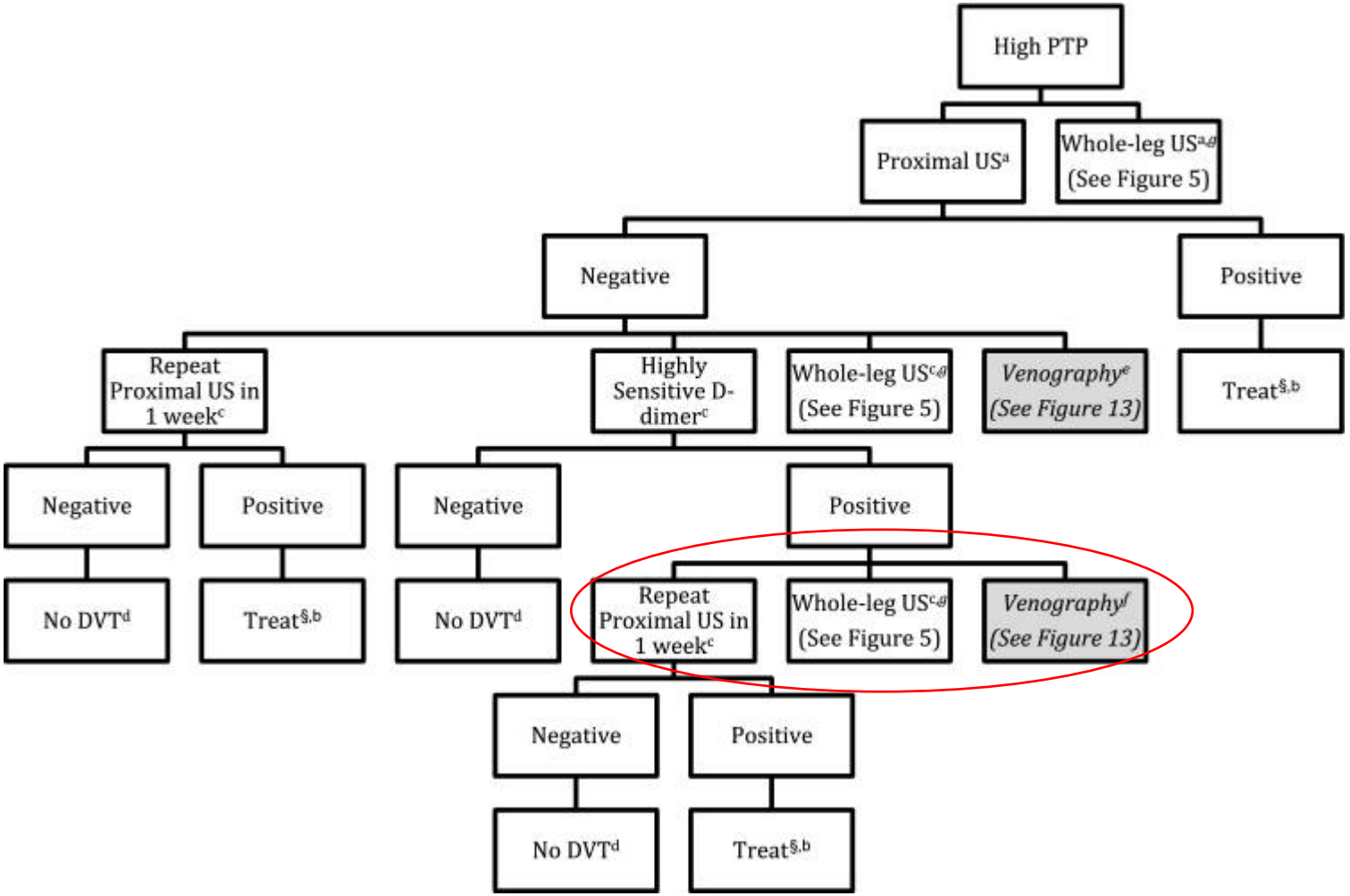
Diagnosis and management of acute deep vein thrombosis: a joint consensus document from the European society of cardiology working groups of aorta and peripheral vascular diseases and pulmonary circulation and right ventricular function Eur Heart J.

- In clinically suspected DVT, VUS provides overall sensitivity of 94.2% for proximal, and 63.5% for isolated distal DVT, with an overall specificity of 93.8%.

- Combination with colour-Doppler US increases sensitivity but lowers specificity. When DVT is suspected (without PE symptoms), anticoagulation may be safely withheld in patients with a single normal complete VUS.

- Limited CUS provided it can be repeated, and integrated within a diagnostic strategy including clinical probability, and D-dimer assessment.

ACCP


High PTP
Proximal US[a]
Whole-leg US[a,g] (See Figure 5)
Negative
Positive
Repeat Proximal US in 1 week[c]
Highly Sensitive D-dimer[c]
Whole-leg US[c,g] (See Figure 5)
Venography[e] (See Figure 13)
Treat[§,b]
Negative
Positive
Negative
Positive
No DVT[d]
Treat[§,b]
No DVT[d]
Repeat Proximal US in 1 week[c]
Whole-leg US[c,g] (See Figure 5)
Venography[f] (See Figure 13)
Negative
Positive
No DVT[d]
Treat[§,b]

- Anticoagulated

- MRV - *High-grade IVC stenosis/atresia. Acute non-occlusive thrombosis of the right external iliac vein. Acute, occlusive thrombus of the right common, common femoral, femoral and popliteal veins.*

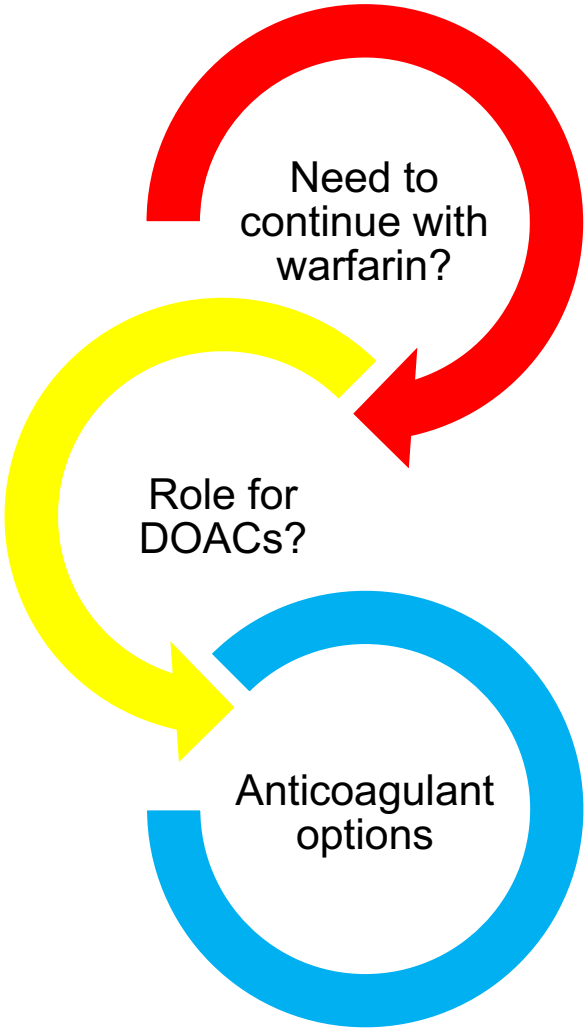
- Admitted for lysis and stenting

- Currently well – legs the same size and back in the gym

- BCSH guidelines (2012) - Patients with acute IVCT should be considered for catheter-directed thrombolytic therapy or endovascular surgery (2C).

Case 3.

- 33 year old woman
- Initially presented with vomiting and auditory disturbance ? Mastoiditis
- CT in keeping with CVST
- Background of menorrhagia
- Recently started COCP


Need to continue with warfarin?
Role for DOACs?
Anticoagulant options

- EINSTEIN, AMPLFY, HOKUSAI VTE and RECOVER – DVT and PE

- European Stroke guidelines (2017) - Recommendation: we do not recommend using NOACs (factor Xa or thrombin inhibitors) for the treatment of CVT, especially during the acute phase. Quality of evidence: very low; Strength of recommendation: weak

- BCSH guidelines (2012) - It is suggested that patients with CVST without contraindications to anticoagulant therapy should be treated early with therapeutic dose LMWH for at least 7 d (2C). It is suggested that oral anticoagulation with warfarin should be delayed until the patient's condition has stabilized (2C). It is suggested that a minimum of 3 months treatment is given (2C).

J Neurol Sci. 2017 Oct 15;381:318-320. doi: 10.1016/j.jns.2017.09.007. Epub 2017 Sep 6.

Apixaban for the treatment of cerebral venous thrombosis: A case series.

Rao SK[1], Ibrahim M[1], Hanni CM[2], Suchdev K[1], Parker D[2], Rajamani K[1], Mohamed W[3].

Author information

Intern Emerg Med. 2016 Mar;11(2):167-70. doi: 10.1007/s11739-016-1398-6. Epub 2016 Feb 13.

Direct oral anticoagulants in rare venous thrombosis.

Finazzi G[1], Ageno W[2].

Author information

Abstract

The direct inhibitors of thrombin (dabigatran) or factor Xa (rivaroxaban, apixaban) are currently used in patients with venous thrombosis of the lower or upper limbs or with pulmonary embolism. However, the use of these direct oral anticoagulants (DOACs) in subjects with abdominal or cerebral venous thrombosis is more contentious due to the paucity of available data. In a few case reports and small series of patients hitherto published, the DOACs showed good efficacy and safety, supporting an extension of their use to these rare conditions. Thus, prospective cohort studies and randomized controlled trials have been set up. In this article, we review the published clinical experience with DOACs in rare venous thrombosis, and provide updated information on ongoing clinical trials.

Take home points

- PESI adjunct to clinical decision making
- Evolving field when it comes to DOAC indications
- Need to individualize management plans when patients fall outside guidelines