An Update on Venous Thromboembolism

ACC - Columbus, Ohio 2013

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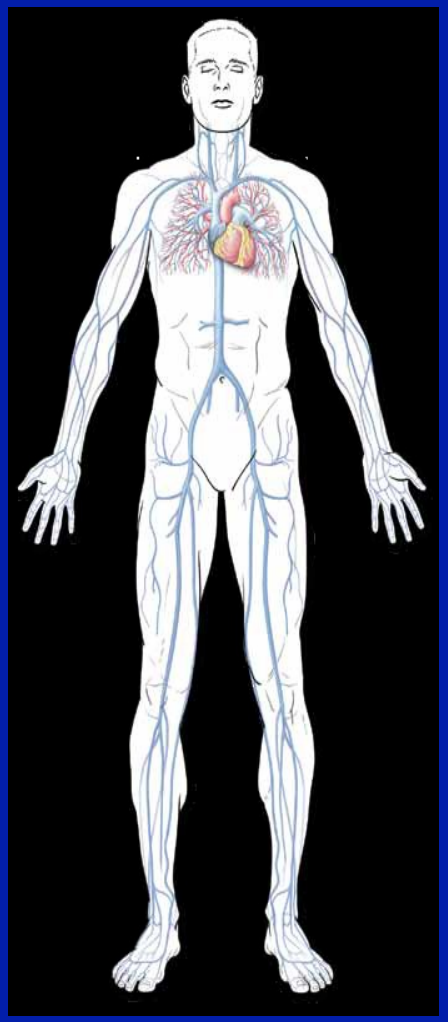
Disclosures:

I am a Consultant for:
Daiichi Sankyo
Genentech
Janssen Pharmaceuticals
The Medicines Company
Zin Industries

Venous Thromboembolism (DVT and PE)

- 3rd most common cardiovascular disease after MI and stroke
- Common, lethal disease (~ 300,000 deaths/yr. in the US)
- Most common preventable cause of hospital death
- Death can be reduced by prompt recognition, diagnosis and treatment



Source: 2009 AHA Heart Disease and Stroke Statistics
NEJM 2008; 358: 1037-1052
Am J Cardiol 2004; 93: 1197-1199

Traditional Risk Factors for VTE

Acquired

- Bed rest, immobility
- CHF, pneumonia, sepsis
- Trauma
- Major surgery (Orthopedic)
- Age and obesity
- Cancer and cancer therapy
- Oral contraceptives, HRT
- Pregnancy, Postpartum state
- Antiphospholipid syndrome
- Myeloproliferative disorders
- Heparin-induced thrombocytopenia
- Inflammatory bowel disease
- Nephrotic syndrome
- Central venous catheters, pacemaker
- Previous VTE
- Air travel

Inherited

- Factor V Leiden
- Prothrombin gene mutation G20210A
- Protein C + S deficiencies
- Antithrombin deficiency
- Elevated factor VIII

Cardiovascular Risk Factors for VTE

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

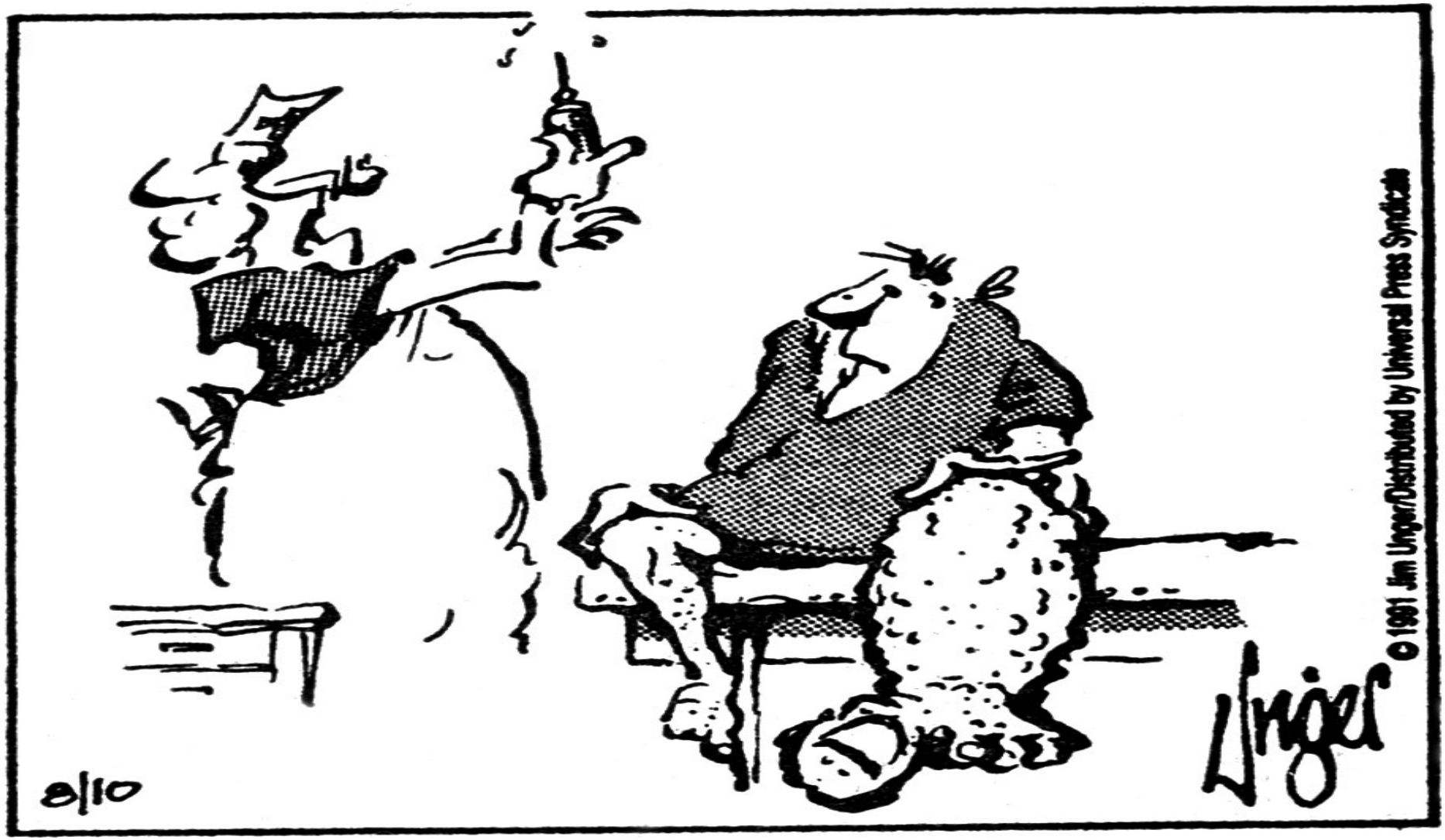
An Association between Atherosclerosis and Venous Thrombosis

Paolo Prandoni, M.D., Ph.D., Franca Bilora, M.D., Antonio Marchiori, M.D.,
Enrico Bernardi, M.D., Francesco Petrobelli, M.D.,
Anthonie W.A. Lensing, M.D., Ph.D., Martin H. Prins, M.D., Ph.D.,
and Antonio Girolami, M.D.

NEJM 2003;348: 1435-1441

Circulation 2008; 117: 93-102

Not All Leg DVTs are Clinically Apparent



"Which leg is it?"

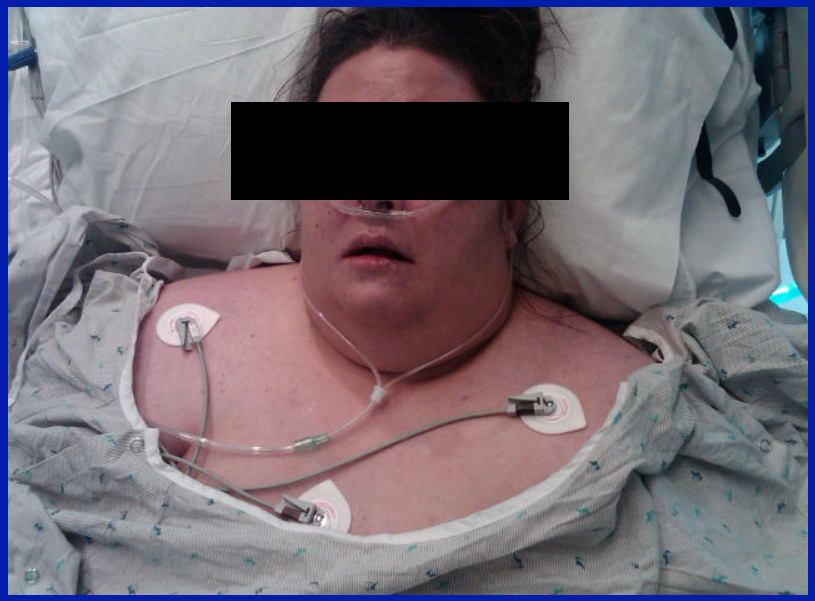
Clinical Decision Rule - Pre-test Probability for DVT

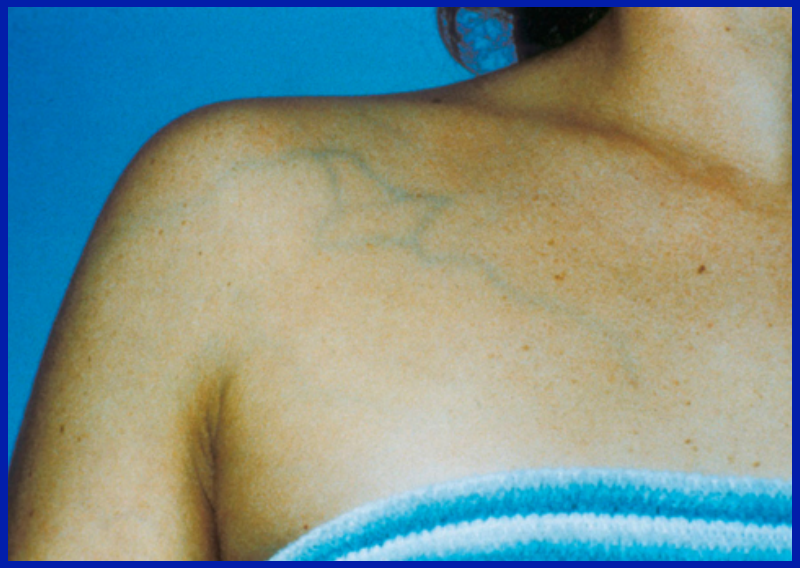
Clinical Features	Score
Active cancer (treatment ongoing or within previous 6 months of palliative treatment)	1
Paralysis, paresis or recent plaster immobilization	1
Recently bedridden for > 3 days or major surgery	1
Local tenderness along the distribution of the deep venous system	1
Swelling of the entire leg	1
Calf swelling (more than 3cm > asymptomatic side)	1
Pitting edema	1
Collateral superficial veins (non varicose)	1
Alternative diagnosis likely	- 2

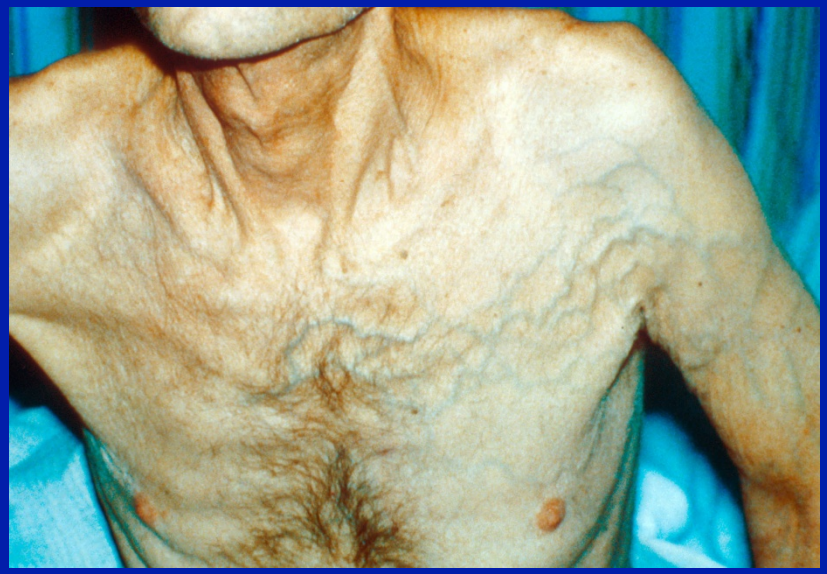
Clinical probability:
High: (3 or more points) PPV of 75%
Moderate: (1 to 2)
Low: (0 points) NPV of 96%; if d-dimer (-) 99%

Wells PS. NEJM 2003; 349: 1227
Wells PS. Lancet 1997;350:1795
Wells PS. JAMA 2006:295:199

Not All Arm DVTs are Clinically Apparent







Clinical Prediction Score for Upper Extremity DVT

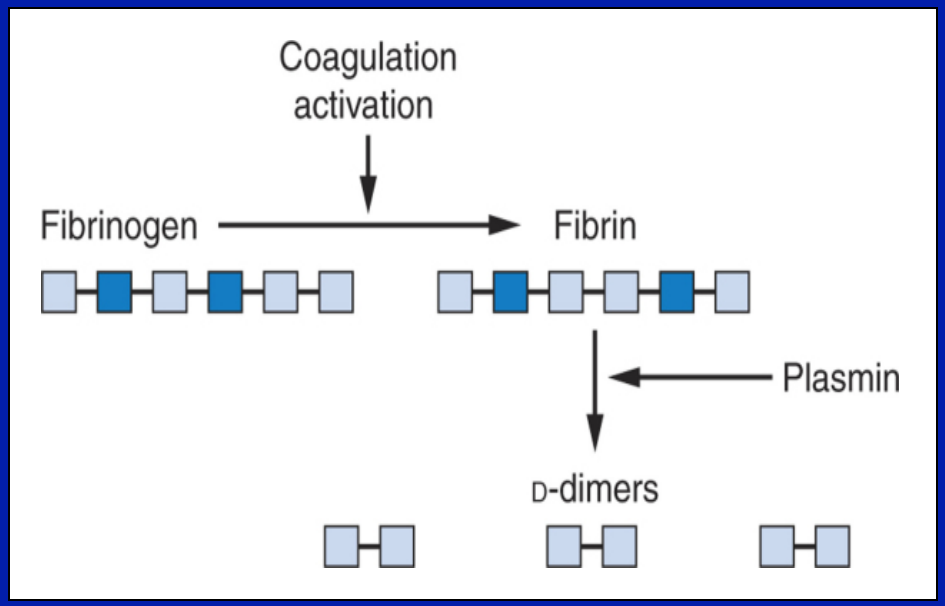
Factors	Points
Catheter or access device in the subclavian or jugular vein or a pacemaker wire	1 point
Localized pain	1 point
Unilateral pitting edema of the extremity	1 point
Other diagnosis at least as likely	- 1 point

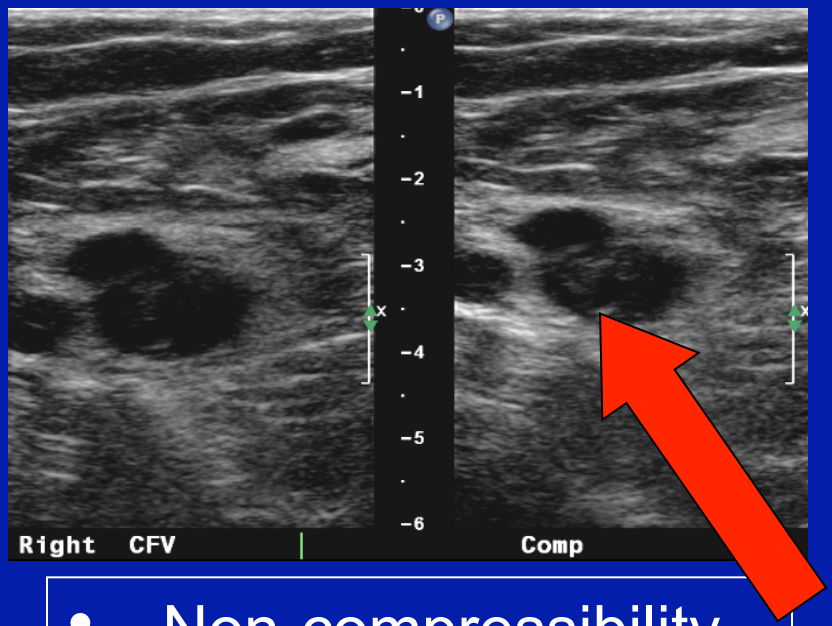
Probability of an upper extremity DVT	Points
13%	0
38%	1
70%	≥2

NEJM 2011; 364: 861-869

Thromb Haemost 2008; 99: 202-207

Diagnosis of VTE –
D-dimer and Duplex Ultrasound

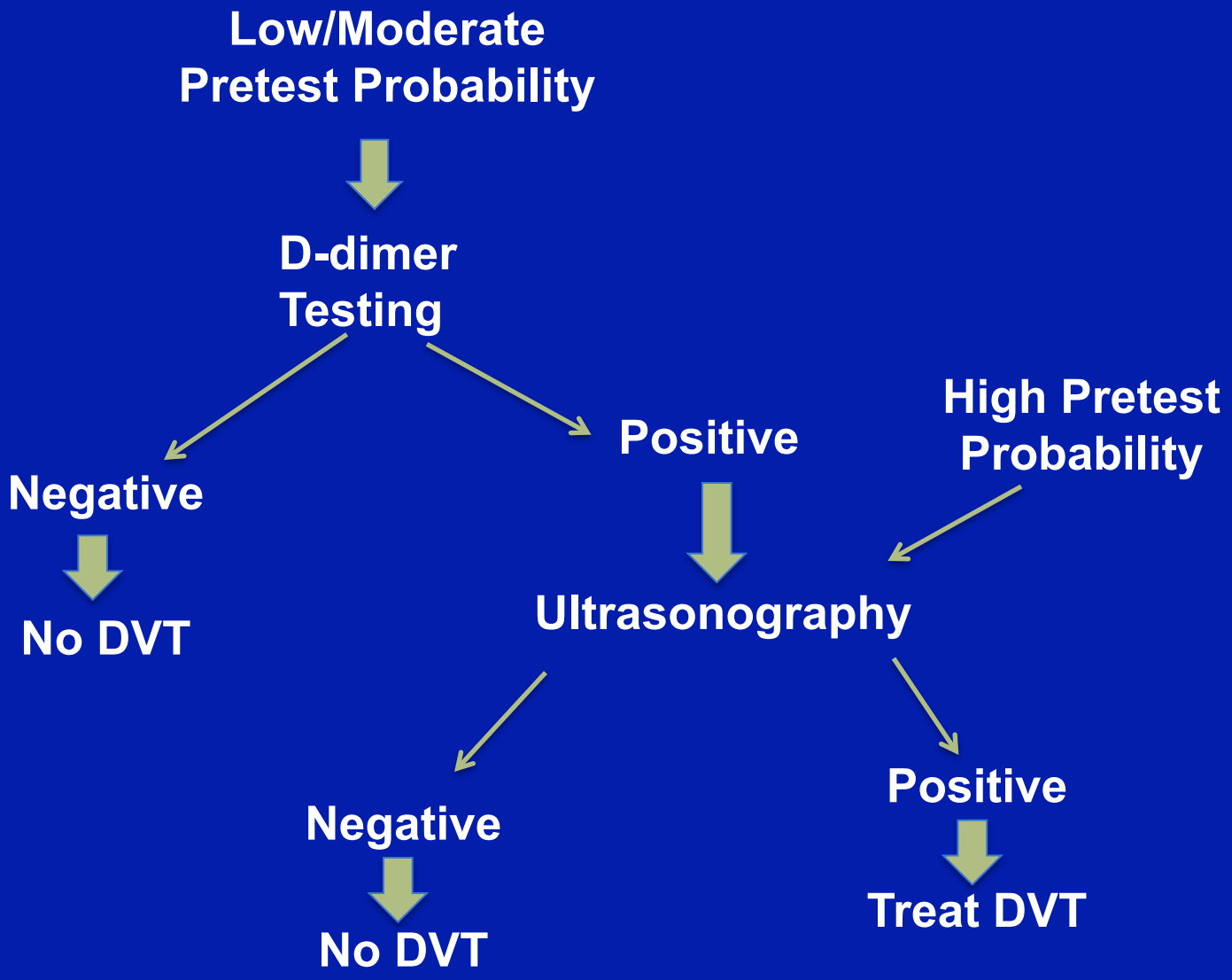




- Sensitive indicator of thrombosis
- Very high negative predictor value

- Non-compressibility
- Visualize thrombus
- Venous Distention
- Absence of flow
- Lack of collaterals

Suspect DVT



CHEST 2012; 141(2suppl)e351S

Key Points in the Diagnosis of DVT

- Clinical exam unreliable *(use pretest probability)*
- D-dimer
- Duplex ultrasound
- Anticoagulate once suspect DVT *(unless contraindicated)*

D-dimer generally not reliable for hospitalized patients

Pulmonary Embolism

Frequently Overlooked

- Almost 25% present as sudden death
- Most nonsudden deaths - failure to diagnose
- Hospital patients at particularly high risk
- Many PE's do not manifest until after discharge

Source: 2009 AHA Heart Disease and Stroke Statistics

NEJM 2008; 358: 1037-10520

Not all PEs are Clinically Apparent

Signs and Symptoms of PE (PIOPED II)

- Dyspnea (79%)
- Tachypnea (57%)
- Pleuritic pain (47%)
- Leg edema, erythema, tenderness, palpable cord (47%)
- Cough/hemoptysis (43%)

Am J Med 2007; 120: 871-879

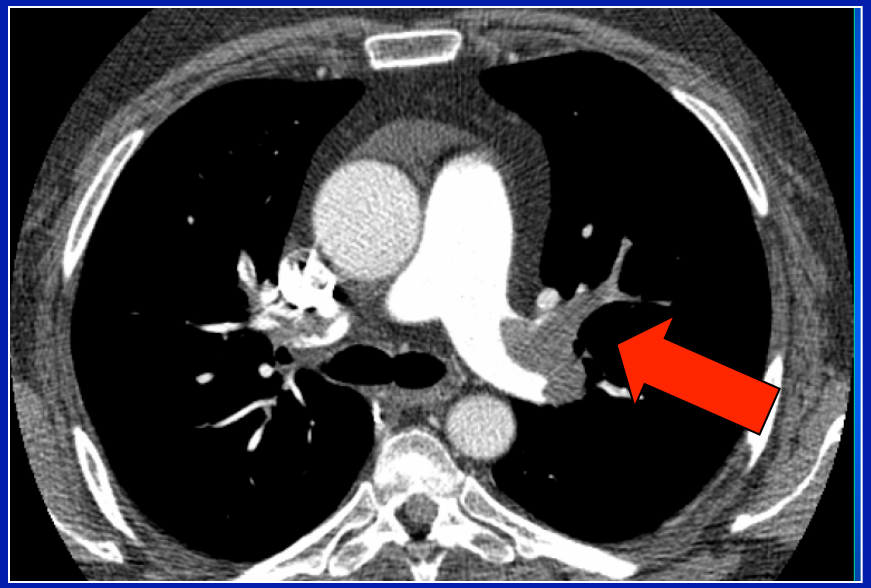
NEJM 2008; 358: 1037-1052

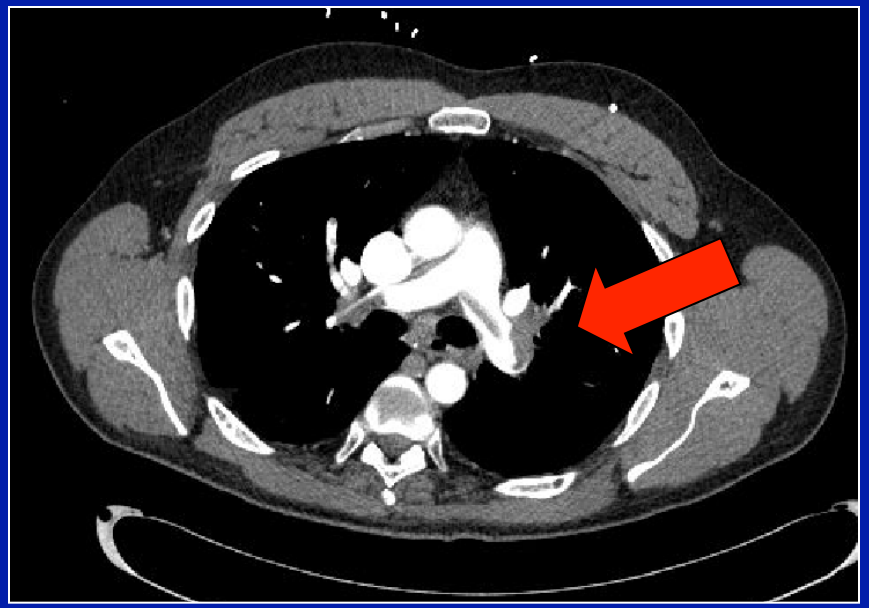
Wells Rule	Original	Simplified
Previous PE or DVT	1.5	1
Heart rate > 100 BPM	1.5	1
Surgery or immobilization within 4 weeks	1.5	1
Hemoptysis	1	1
Malignancy (on treatment); treated in last 6 months or palliative	1	1
Clinical signs and symptoms of DVT	3	1
Alternative diagnosis less likely than PE	3	1
Clinical probability		
PE unlikely	≤4	≤1
PE likely	>4	>1

Thromb Haemost 2000; 83: 416-420
Ann Intern Med 2011; 154: 709-718
Blood 2013; 121: 4443-4448

Multidetector CT Angiography - CTPA

- Directly visualizes thrombi
- Detects nonthromboembolic pathology (mediastinal and parenchymal structures)
- Positive RV enlargement = (RV_D/ LV_D > 0.9) also helps predict adverse clinical events

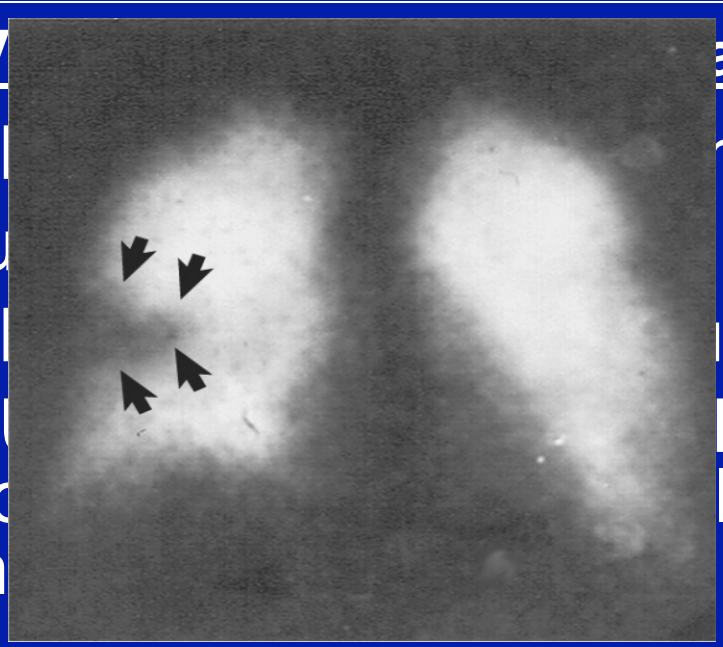


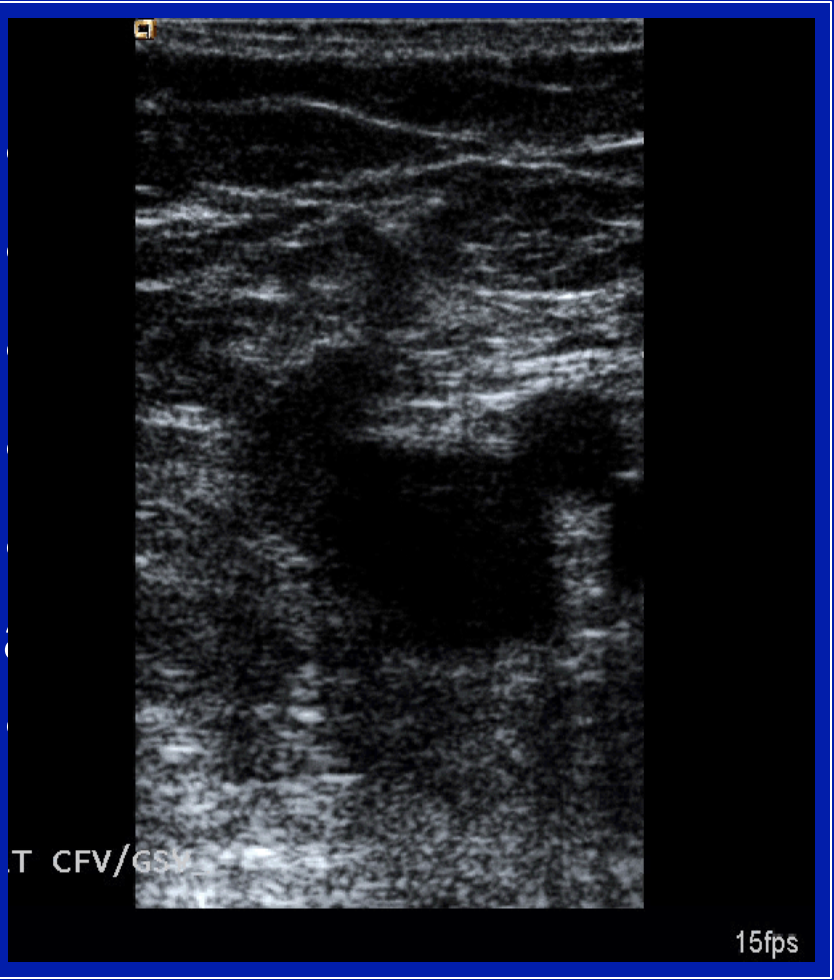


Circulation 2004; 109: 2401-2404

NEJM 2008; 358: 1037-1052

Other Diagnostic Options



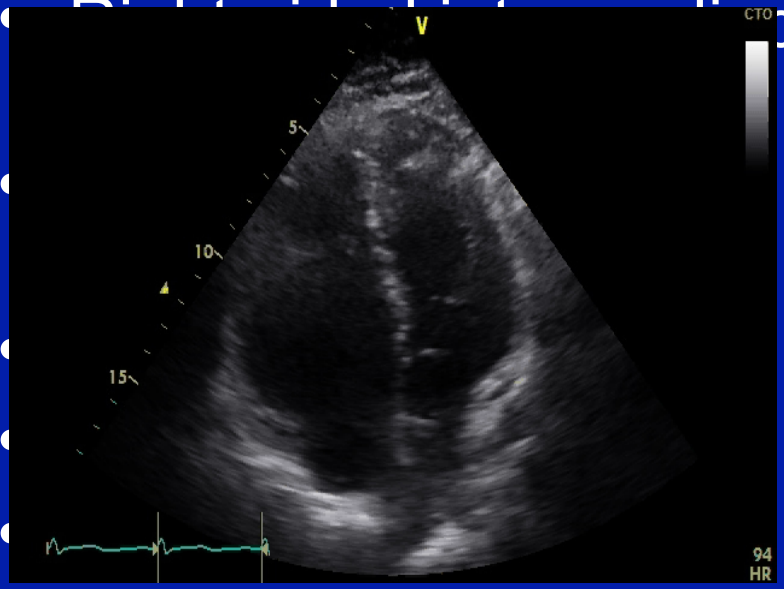


Eur Heart J 2008; 29: 2276-2315

Am J Respir Crit Care Med 2010; 181:983-991

Echocardiography and Biomarkers

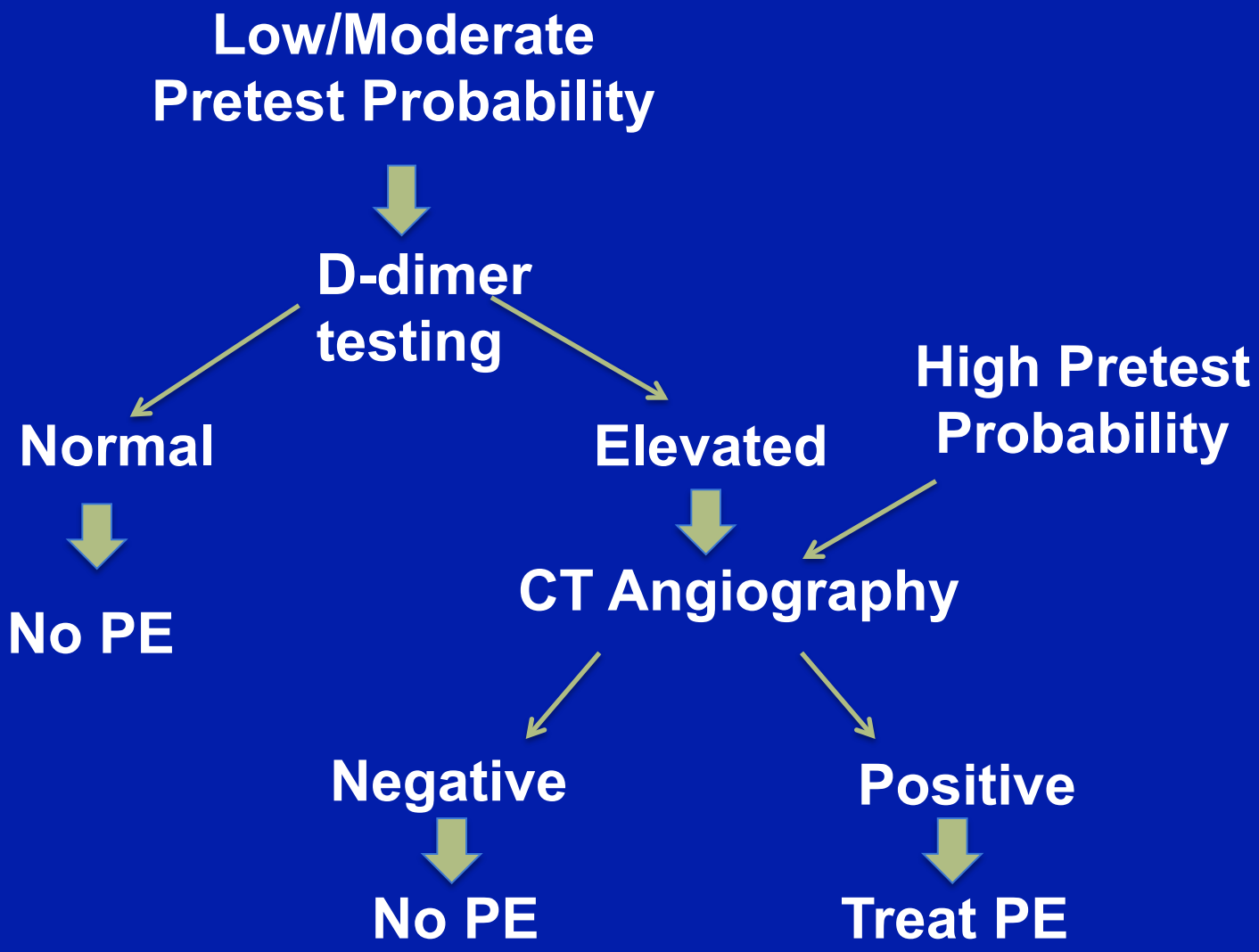
Diagnostic and Predictors of Adverse Outcome



- Troponins and BNP or N-terminal proBNP (NT-proBNP) levels correlate with echo findings of right ventricular pressure overload and are predictors of adverse outcomes: associated with overall mortality, major clinical events, and recurrence

Circulation 2007;116:427-433
Eur Heart J 2007; 28: 224-229
Am J Med 2006; 119: 1048-1055

Diagnosis of PE



CHEST 2012; 141(2suppl)e351S

3-Month VTE Failure Rate Per Strategy to exclude PE

Strategy to Exclude PE	Patients, No.	Failures, No.	3 month VTE rate, % (95% CI)
Normal d-dimer test result	563	13	2.3 (1.4-3.9)
Normal d-dimer test result in patients with an unlikely clinical probability of PE	477	5	1.1 (0.4 2.4)
Normal d-dimer test result in patients with a likely clinical probability of PE	86	8	**9.3 (4.8-17.3)**

CHEST 2008; 134:789-793

Key Points for the Diagnosis of PE

- Clinical exam unreliable
- CT angiography - diagnosis of choice
- Negative D-dimer (high NPV unless the patient has high pretest probability score)
- Positive venous duplex (usually) adequate for treatment
- Start *anticoagulation once PE suspected (if no contraindication)*

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Antithrombotic Therapy for VTE Disease : Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines

Clive Kearon, Elie A. Akl, Anthony J. Comerota, Paolo Prandoni, Henri Bounameaux, Samuel Z. Goldhaber, Michael E. Nelson, Philip S. Wells, Michael K. Gould, Francesco Dentali, Mark Crowther and Susan R. Kahn

Chest 2012;141;e419S-e494S
DOI 10.1378/chest.11-2301


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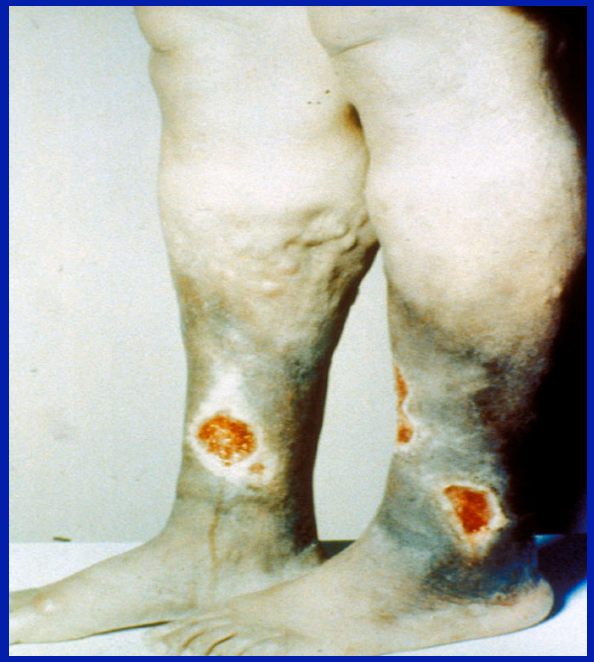
Anticoagulation is Sufficient for the Majority of Patients with Acute DVT



Grade 2C: weak recommendation, low or very low quality evidence

Chest 2012; 141;e419S-494S

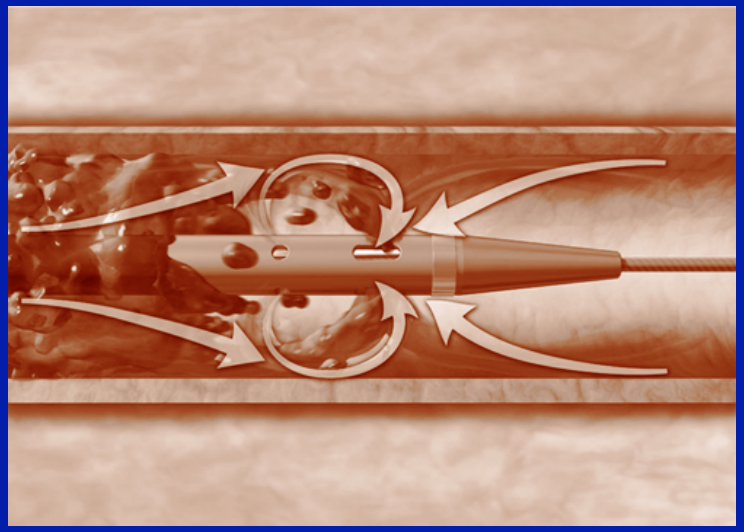
Recommendations for Endovascular Thrombolysis and Surgical Venous Thrombectomy

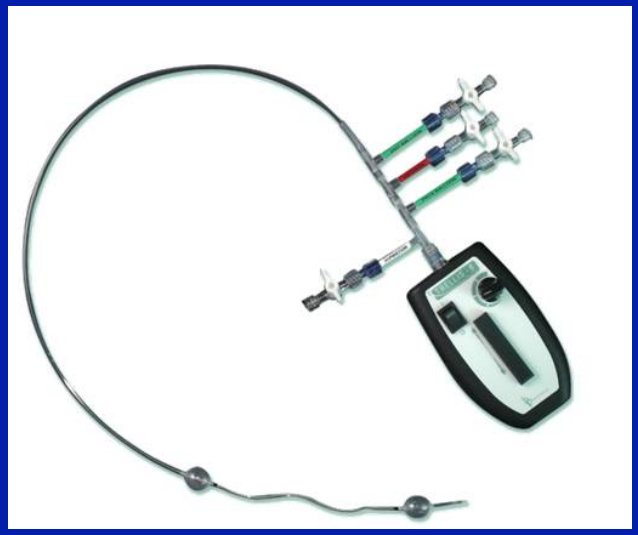
- CDT or ***PCDT (pharmacomechanical CDT)*** should be given to patients with iliofemoral DVT associated with limb-threatening compromise. ***(Class I; Level of Evidence C).***
- CDT or PCDT is reasonable as first-line treatment of patients with acute iliofemoral DVT to prevent PTS in selected patients at low risk of bleeding complications. ***(Class IIa; Level of Evidence B).***

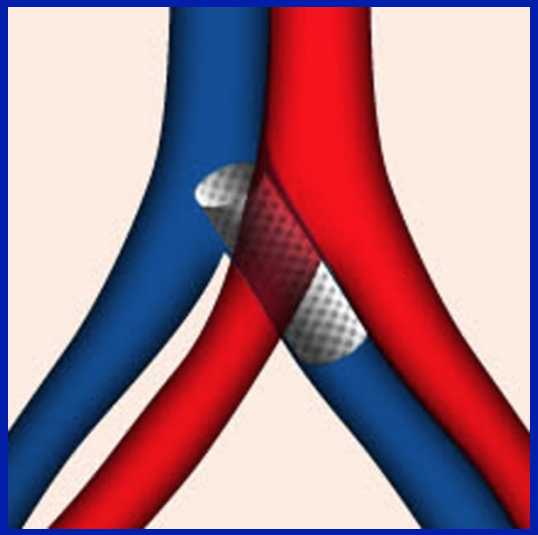
Class IIa (benefits >> risk) Class IIb (benefits ≥ risk)
Level B: limited populations evaluated, data derived from a single, randomized trial

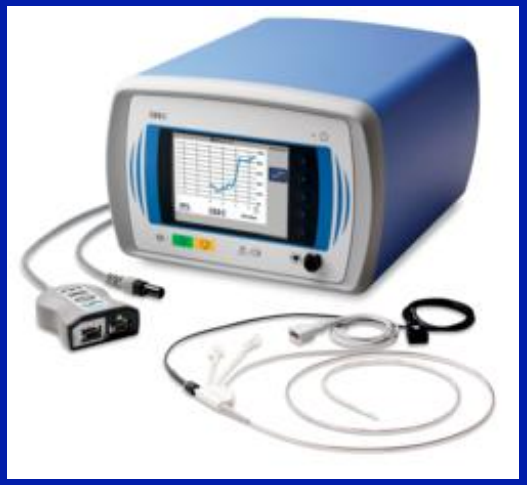
Circulation 2011; 1123: 1788-1830

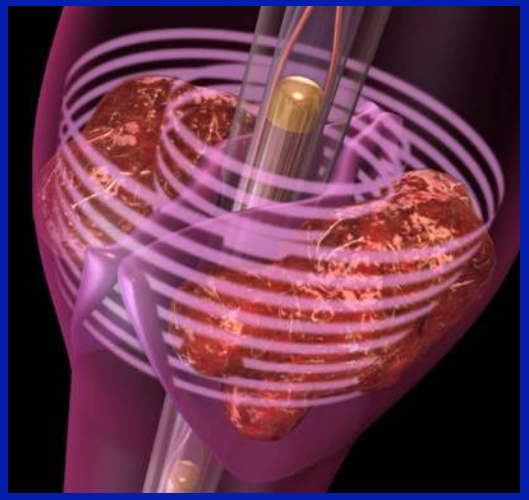
Interventional Approaches to Prevent the PTS and Reestablish Venous Patency











J Endovasc Ther 2012; 19: 273-280

Postthrombotic Syndrome

Author/Year	Journal	N	2-Year PTS
Prandoni 1996	Ann Intern Med	355	**23%**
Brandjes 1997	Lancet	96	**23%**
Prandoni 2004	Ann Intern Med	90	**25%**
Partsch 2004	Int J Angiol	37	**46%**
Van Dongen 2005	J Thromb Haemost	244	**30%**
Kahn 2008	Ann Intern Med	387	**40% (60%)**
Enden 2012	Lancet	99	**56%**
(Kahn 2013)	Presented at ASH	806	**52%**

Thrombus Obliteration by Rapid Percutaneous Endovenous Intervention in Deep Venous Occlusion (TORPEDO) Trial

	Anticoagulation	PEVI + anticoagulation
Proximal DVT	92 patients	91 patients
6 months	Recurrent VTE 14.8% PTS - 27.2%	Recurrent VTE 2.3% PTS - 3.4%
30 months	Recurrent VTE 16% PTS - 29.6%	Recurrent VTE 4.5% PTS - 6.8%

J Endovasc Ther 2012; 19:273-280

Risk Stratification for Acute PE

- Clinical examination (BP, HR, O_2 saturation)
- Biomarkers (Troponin, BNP)
- RV and PA pressures-ECHO
- RV and PE size (Chest CT)

Normal (BP + RV) =
Low Risk:
Anticoagulation
(Hospital mortality <4%)

Normal BP
↑ Biomarkers,
RV dysfunction:
Controversial
(Hospital mortality 5 -10%)

Shock =
High Risk:
Lysis or Embolectomy
± *IVC filter*
(Hospital mortality 30%)

Chest 2008; 133 (suppl) 454S-545S

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Chest 2012;141;e419S-e494S
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Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION
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Management of Massive and Submassive Pulmonary Embolism, Iliofemoral Deep Vein Thrombosis, and Chronic Thromboembolic Pulmonary Hypertension: A Scientific Statement From the American Heart Association

Michael R. Jaff, M. Sean McMurtry, Stephen L. Archer, Mary Cushman, Neil Goldenberg, Samuel Z. Goldhaber, J. Stephen Jenkins, Jeffrey A. Kline, Andrew D. Michaels, Patricia Thistlethwaite, Suresh Vedantham, R. James White, Brenda K. Zierler and on behalf of the American Heart Association Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation, Council on Peripheral Vascular Disease, and Council on Arteriosclerosis, Thrombosis and Vascular Biology

CLINICAL RESEARCH STUDY

THE AMERICAN JOURNAL of MEDICINE®

Thrombolytic Therapy in Unstable Patients with Acute Pulmonary Embolism: Saves Lives but Underused

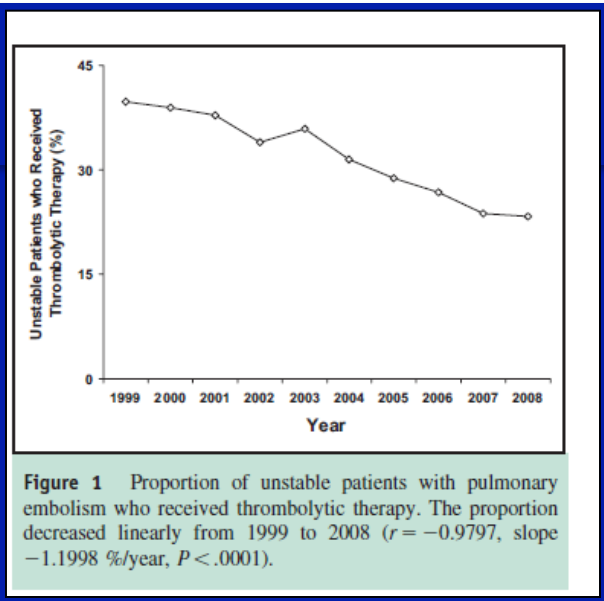


Figure 1 Proportion of unstable patients with pulmonary embolism who received thrombolytic therapy. The proportion decreased linearly from 1999 to 2008 ($r = -0.9797$, slope -1.1998 %/year, $P < .0001$).

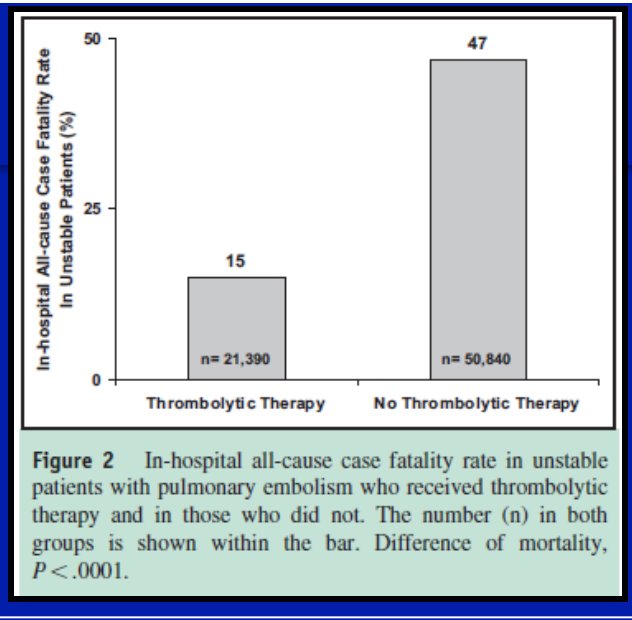


Figure 2 In-hospital all-cause case fatality rate in unstable patients with pulmonary embolism who received thrombolytic therapy and in those who did not. The number (n) in both groups is shown within the bar. Difference of mortality, $P < .0001$.

- **2,110,320 patients discharged from short stay hospital in US with a diagnosis of PE from 1999 to 2008**
- **72,230 (3.4%) were unstable (in shock or ventilator dependent)**
- **All-cause case fatality rate in unstable patients with thrombolytic therapy was 15% vs. 47% without thrombolytic therapy. (p <.0001)**

Data from Nationwide Inpatient Sample

Am J Med 2012; 125: 465

Recent Clinical Trials

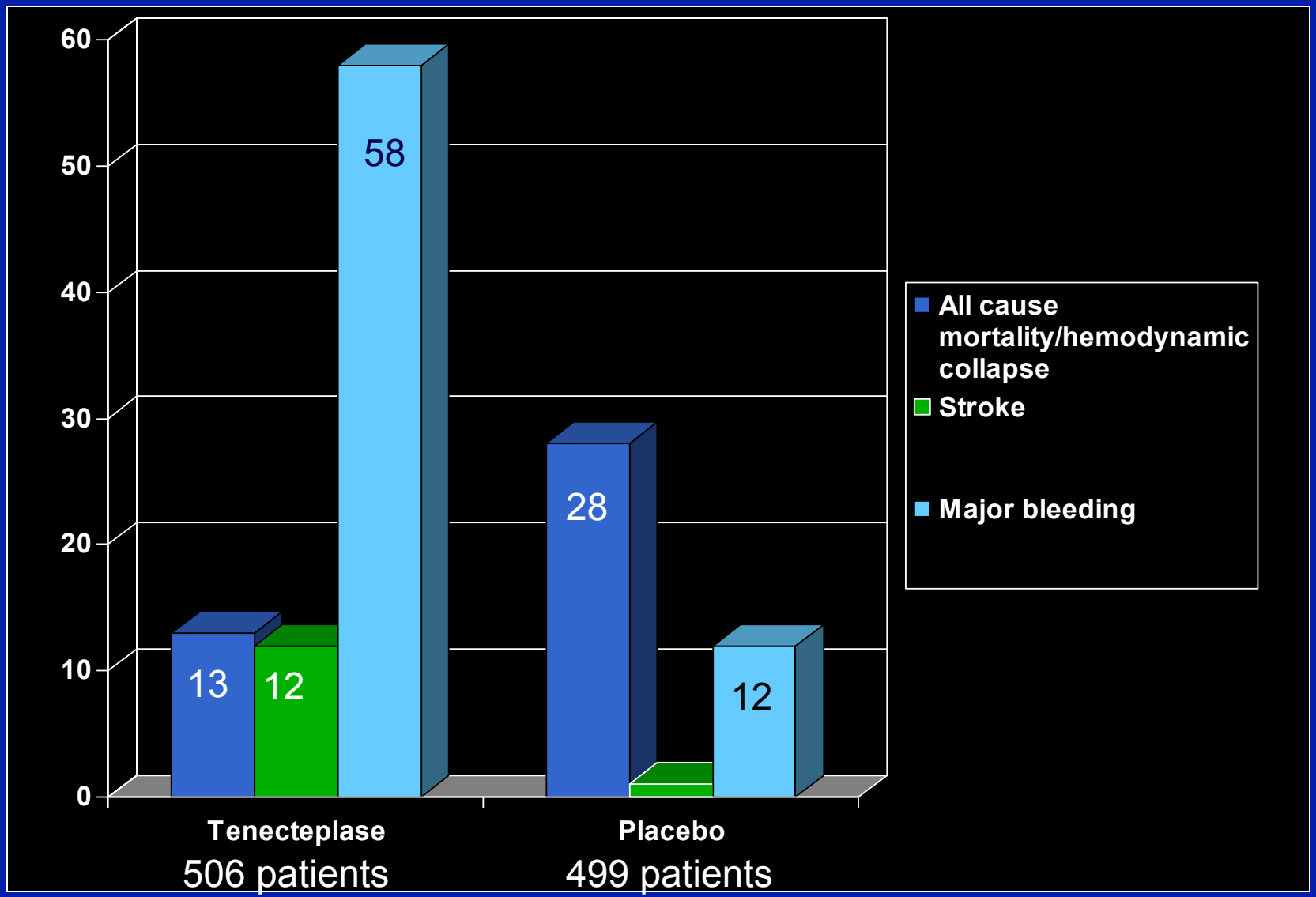
Thrombolysis and PE

TRIAL	Endpoints
MOPETT	• Evaluated low-dose alteplase (50 mg) for reduction of pulmonary artery pressure in patients with moderate PE
PEITHO	• Benefits vs. risk of Tenecteplase in normotensive patients with acute PE and evidence of RV dysfunction/myocardial injury (presented at ACC 2013)
TOPCOAT	• Tenecteplase for severe submassive PE and follow up at 5 and 90 days (presented at ACC 2013)

Am J Cardiol 2013; 111: 273-277

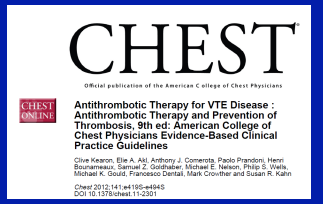
PEITHO Trial

"Pulmonary Embolism Thrombolysis Study"

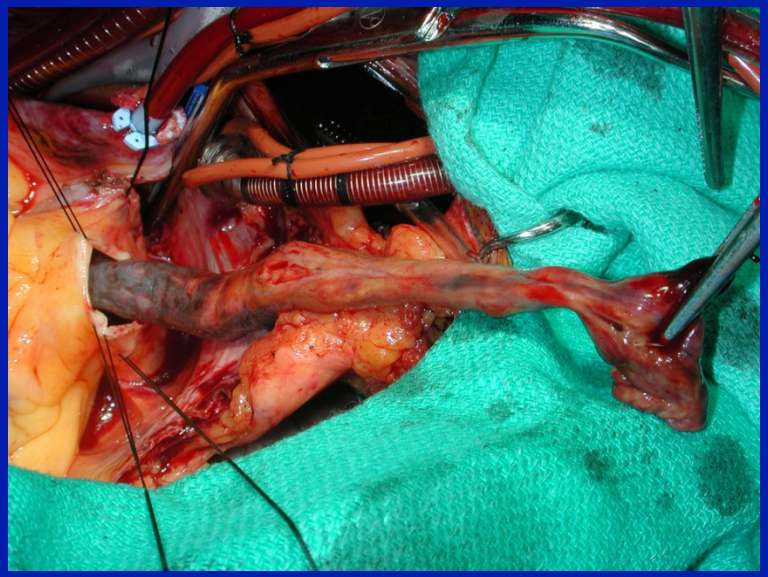


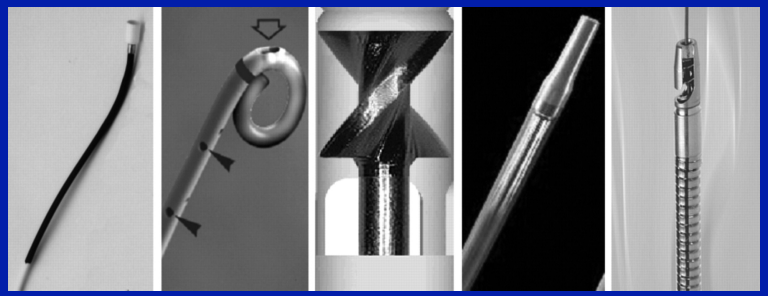
Presented at ACC 2013

Catheter-Based Interventions or Surgical Embolectomy



- Patients with absolute contraindications to thrombolysis or (thrombolysis has failed) surgical embolectomy is preferred therapy (Grade 2C)
- If not immediately available, catheter embolectomy or thrombus fragmentation may be considered (Grade 2C)





Grade 2C: weak recommendation, low or very low quality evidence

Chest 2007;132:657-663

Eur Heart Journal 2008; 29: 2276-2315

Circulation 2011; 123: 1788-1830

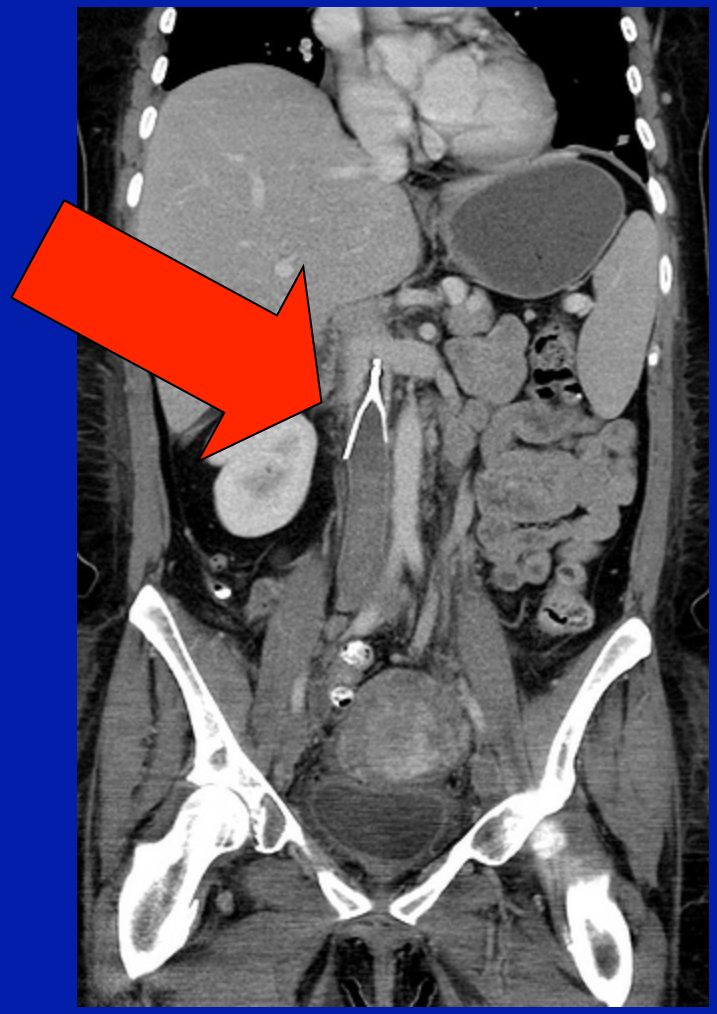
IVC filters

Absolute Indications:_

- Contraindication to anticoagulation
- Recurrent VTE despite adequate anticoagulation
- Complication of anticoagulation

Relative Indications

- Iliocaval DVT
- Large free-floating proximal DVT
- Massive PE treated with thrombolysis/ thrombectomy
- Chronic PE with thromboendarterectomy



Routine use of IVC filters for VTE is NOT recommended

CHEST 2008; 133: 454S-545S

Medical Devices

Removing Retrievable Inferior Vena Cava Filters: Initial Communication

Date Issued: August 09, 2010

Audience: For implanting physicians and clinicians responsible for the ongoing care of patients with inferior vena cava (IVC) filters. Includes interventional radiologists, interventional cardiologists, vascular surgeons, emergency room physicians (trauma), bariatric surgeons, orthopedic surgeons, primary care physicians.

Device:

IVC filters are small, cage-like devices that are inserted into the inferior vena cava (the main vessel returning blood from the lower half of the body to the heart) to capture blood clots and prevent them from reaching the lungs. IVC filters are frequently placed in patients at risk for pulmonary embolism (a blood clot in the lungs) when anticoagulant therapy cannot be used or is ineffective. Some patients may require long-term protection from PE, and implantation of permanent IVC filters is often performed in these cases. Others only require short-term protection, in which case retrievable IVC filters are typically used, as these devices have the option to be removed once the patient's risk of PE subsides.

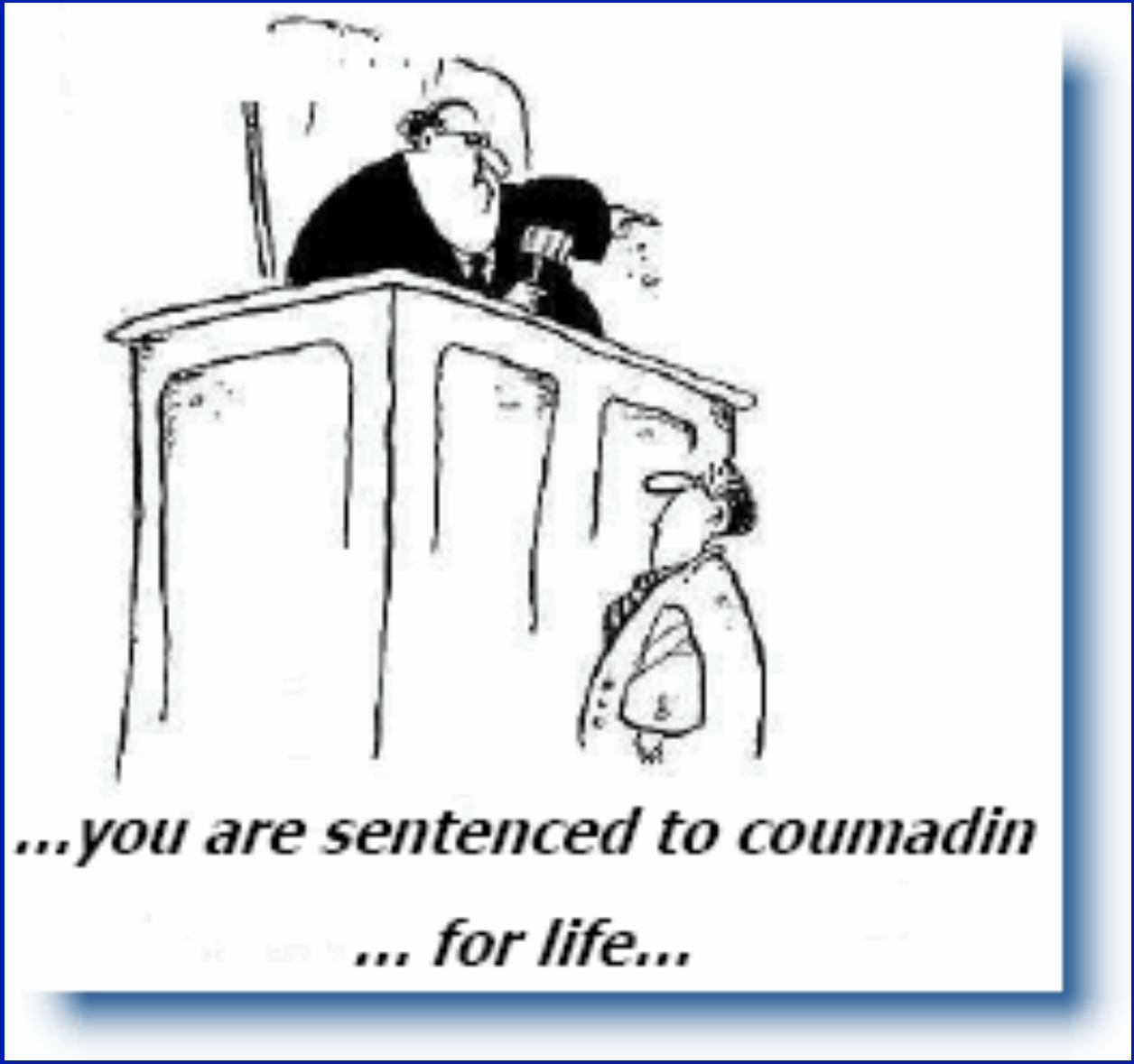
Summary of Problem and Scope:

IVC filter usage has increased rapidly during the past thirty years. In 1979, 2,000 IVC filters were used, while in 2007, almost 167,000 filters were implanted, and the market for IVC filters is only expected to increase, with an estimated 259,000 IVC filters to be deployed in 2012 (Smouse and Johar, *Endovascular Today*, February 2010).

Since 2005, the FDA has received 921 device adverse event reports involving IVC filters, of which 328 involved device migration, 146 involved embolizations (detachment of device components), 70 involved perforation of the IVC, and 56 involved filter fracture. Some of these events led to adverse clinical outcomes in patients. These types of events may be related to a retrievable filter remaining in the body for long periods of time, beyond the time when the risk of PE has subsided.

The FDA is concerned that these retrievable IVC filters, intended for short-term placement, are not always removed once a patient's risk for PE subsides. Known long term risks associated with IVC filters include but are not limited to lower limb deep vein thrombosis (DVT), filter fracture, filter migration, filter embolization and IVC

Are There Other Treatment Options?



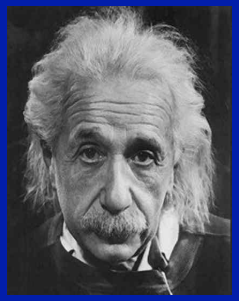

NEW
KIDS
on the
BLOCK

	Rivaroxaban*	Apixaban	Dabigatran	Edoxaban
Target	**Xa**	**Xa**	***IIa***	**Xa**
Time to peak (hours)	**2-3**	2-3	*1.5 -3*	1-3
Half-life (hours)	**4-9** **up to 12 hrs>75 yr**	10-14	*14-17*	8-10
Renal excretion (%)	**66%** **33% biliary**	25% 75% biliary	*80%*	35%
Antidote	**None**	None	*None*	None
Dosing For DVT	**Prophylaxis - 10 mg daily** **Treatment - 15 mg BID x 21 days then 20 mg daily**	Prophylaxis – 2.5 mg BID Extended treatment 2.5 or 5 mg BID	*Prophylaxis –150 mg or 220 mg/d* *Treatment - 150 mg BID*	Treatment – 60 mg daily
Approval in US*	**Prophylaxis THR, TKR** **Treatment of VTE**	No FDA indication for VTE	*No FDA indication for VTE*	No FDA indication

ORIGINAL ARTICLE

Oral Rivaroxaban for Symptomatic Venous Thromboembolism

The EINSTEIN Investigators*



Open-label, randomized, event-driven, noninferiority study comparing **rivaroxaban** (alone) to **SC enoxaparin** plus a **VKA** for **symptomatic VTE**

Agent	# Patients	# Recurrent VTE	# Major bleeding or clinically relevant nonmajor bleeding
Rivaroxaban 15 mg twice daily for 3 weeks, followed by 20 mg daily (for 3, 6, 12 months)	1731	36 (2.1%)	8.1%
Enoxaparin plus VKA (for 3, 6 ,12 months)	1718	51 (3.0%)	8.1%

Rivaroxaban offers a simple, single-drug approach to the short term and continued treatment of venous thrombosis that may improve the benefit-to-risk profile of anticoagulation

NEJM 2010; 363: 2499-2510

The Diagnosis of PE is not an absolute indication for hospital admission!

Who is a candidate for outpatient treatment?

- No comorbid conditions such as heart failure, cancer or chronic lung disease
- No need for oxygen therapy
- No need for parenteral narcotics for pain
- Not at high risk for hemorrhage
- Hemodynamically stable
  - Pulse < 100 min
  - Systolic blood pressure > 100 mmHg

J Thromb Haemost 2010;8: 2406
J Thromb Haemost 2010;8: 2404

Pulmonary Embolism Severity Index (PESI)

Estimates the risk of 30-day mortality from PE

Predictor based on 11 characteristic	Points assigned
Age	Age, in yr
Male sex	**+10**
Cancer	**+30**
Heart failure	**+10**
Chronic lung disease	**+10**
Pulse ≥ 110/min	**+20**
BP <100 mmHg	**+30**
RR ≥ 30/min	**+20**
Temp < 36° C	**+20**
Altered mental status	**+60**
Arterial O2 sat < 90%	**+20**

Simplified Version

(Score > 1 = high risk)

- age > 80 y
- history of cancer
- COPD
- pulse ≥110 bpm
- BP < 100 mmHg
- arterial O_2 sat < 90%

Patients in Simplified PESI:

Low risk 30-day mortality of 1%

High risk 30-day mortality of 10.9%

Am J Respir Crit Care Med 2005;172:1041
Arch Intern Med 2010; 170: 1383

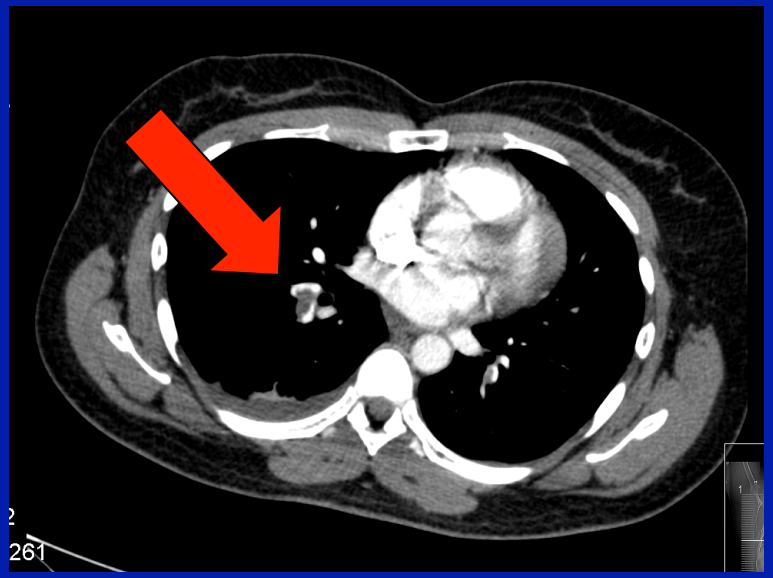
Who is a candidate for outpatient Rx?

Previous criteria plus:

- PESI score < 85 or Simplified PESI score - 0
- No recent bleeding
- Platelet count >70,000 mm^3
- No severe liver or renal disease
- Good social support
- Compliant
- Patient comfortable at home

Incidental or Asymptomatic PE

- Occurs in ~1% in outpatients who undergo CT scanning
- Occurs in ~4% of inpatients
- Majority of patients undergoing study for malignancy
- Review the CT scan to confirm the diagnosis
- If uncertain consider other tests:
  - ultrasound of the legs, arms
  - d-dimer
  - CTPA
- Rx same as for symptomatic PE



CHEST 2012; 141e419S.

Official publication of the American College of Chest Physicians

CHEST ONLINE

Antithrombotic Therapy for VTE Disease : Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines

Clive Kearon, Elie A. Akl, Anthony J. Comerota, Paolo Prandoni, Henri Bounameaux, Samuel Z. Goldhaber, Michael E. Nelson, Philip S. Wells, Michael K. Gould, Francesco Dentali, Mark Crowther and Susan R. Kahn

Length of Therapy	Recommended treatment duration	**Grade of recommendation**
First VTE secondary to a *transient risk factor*	3 months	1B
Unprovoked VTE Assess for long-term treatment after 3 months and assess risk-benefits annually	3 months minimum consider extended therapy	1B
Recurrent VTE	Extended therapy	1B
VTE *secondary to cancer* recommend	Extended therapy	1B
VTE *secondary to cancer*: LMWH over VKA		2B

Chest 2012; 141; e4195-e4954

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

D-Dimer Testing to Determine the Duration of Anticoagulation Therapy

Gualtiero Palareti, M.D., Benilde Cosmi, M.D., Ph.D., Cristina Legnani, D.Sci., Ph.D., Alberto Tosetto, M.D., Carlotta Brusi, M.D., Alfonso Iorio, M.D., Vittorio Pengo, M.D., Angelo Ghirarduzzi, M.D., Corrado Pattacini, M.D., Sophie Testa, M.D., Anthonie W.A. Lensing, M.D., and Armando Tripodi, D.Sci., Ph.D., for the PROLONG Investigators*

- Elevated D-dimer after discontinuing warfarin
- Patients with an abnormal D-dimer one month after discontinuing anticoagulation have a significant incidence of recurrent VTE, which is reduced by resuming anticoagulation. The rate is doubled one month after stopping warfarin

NEJM 2006; 355: 1780-1789

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MAY 24, 2012 VOL. 366 NO. 21

Aspirin for Preventing the Recurrence of Venous Thromboembolism

ESTABLISHED IN 1812 NOVEMBER 22, 2012 VOL. 367 NO. 21

Low-Dose Aspirin for Preventing Recurrent Venous Thromboembolism

Timothy A. Brighton, M.B., B.S., John W. Eikelboom, M.B., B.S., Kristy Mann, M.Biostat., Rebecca Mister, M.Sc.,

WARFASA Study demonstrated a 42% reduction in the rate of recurrence of VTE with aspirin compared to placebo (rate of recurrence 6.6% vs.. 11.2% per year)

ASPIRE Trial showed a non significant decrease in the rate of recurrent VTE with aspirin as compared with placebo (rate of recurrence 4.8% vs. 6.5% per year)

Pooling the data from the 2 trials: there was a 32% reduction in the rate of VTE and a 34% reduction in the rate of major vascular events

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

A Randomized Trial of Rosuvastatin in the Prevention of Venous Thromboembolism

Robert J. Glynn, Sc.D., Eleanor Danielson, M.I.A., Francisco A.H. Fonseca, M.D., Jacques Genest, M.D., Antonio M. Gotto, Jr., M.D., John J.P. Kastelein, M.D., Wolfgang Koenig, M.D., Peter Libby, M.D., Alberto J. Lorenzatti, M.D., Jean G. MacFadyen, B.A., Børge G. Nordestgaard, M.D., James Shepherd, M.D., James T. Willerson, M.D., and Paul M Ridker, M.D.

ABSTRACT

N Engl J Med 2009; 360:1851.

Venous Thromboembolism
The Good, The Bad and The Ugly


CMS
CENTERS for MEDICARE & MEDICAID SERVICES

Methods for Prevention of VTE – The Good

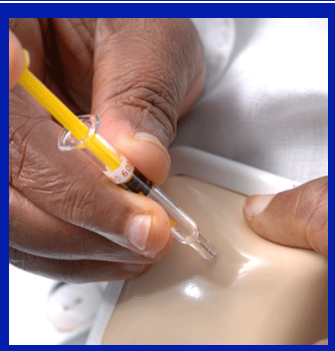
Clint Eastwood

Pharmacologic:

- LMWH
- Heparin
- Fondaparinux
- Iprivask
- Warfarin
- Rivaroxaban

Mechanical:

- Intermittent pneumatic compression (IPC)
- Graduated elastic compression stockings (GCS)



Chest. 2008:133(6)(suppl);381S-453S
Am J Health Syst Pharm. 2002;59(20)(suppl 6):S7-S14


What type of mechanical DVT prophylaxis do you recommend we use?

Electronic Alerts – The Good

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 10, 2005 VOL. 352 NO. 10

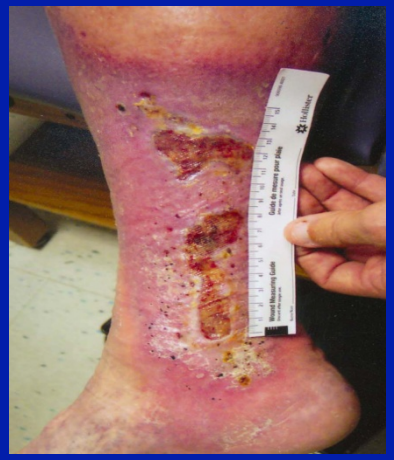
Electronic Alerts to Prevent Venous Thromboembolism among Hospitalized Patients

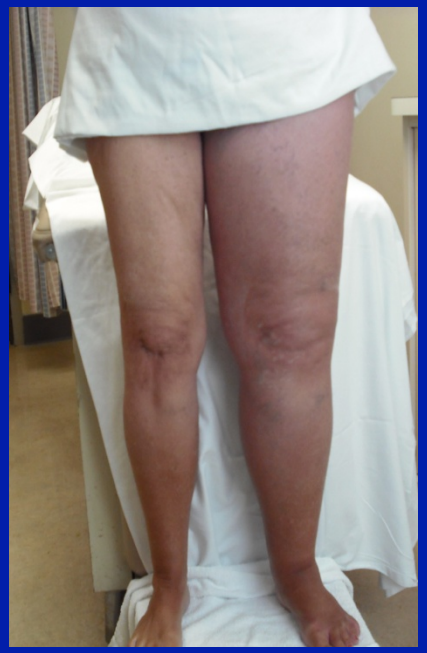
Nils Kucher, M.D., Sophia Koo, M.D., Rene Quiroz, M.D., M.P.H., Joshua M. Cooper, M.D., Marilyn D. Paterno, B.S., Boris Soukonnikov, M.S., and Samuel Z. Goldhaber, M.D.

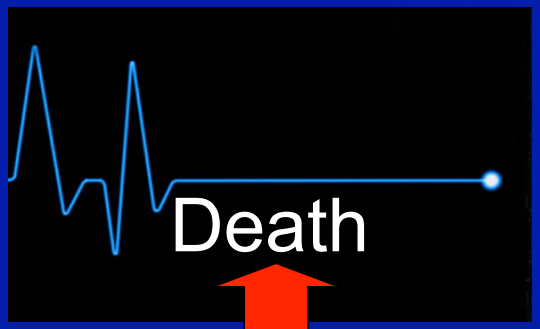
NEJM 2005; 352:969-977

Venous Thromboembolism

The Bad







Pulmonary hypertension

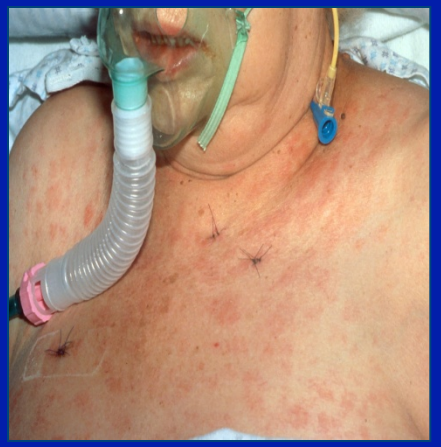
Pulmonary embolism

Post-thrombotic syndrome

Symptomatic DVT

Asymptomatic DVT

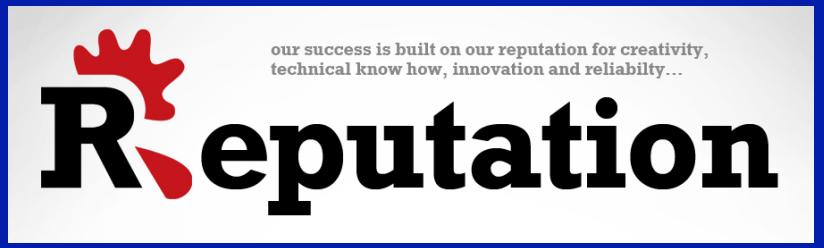
Eli Wallach



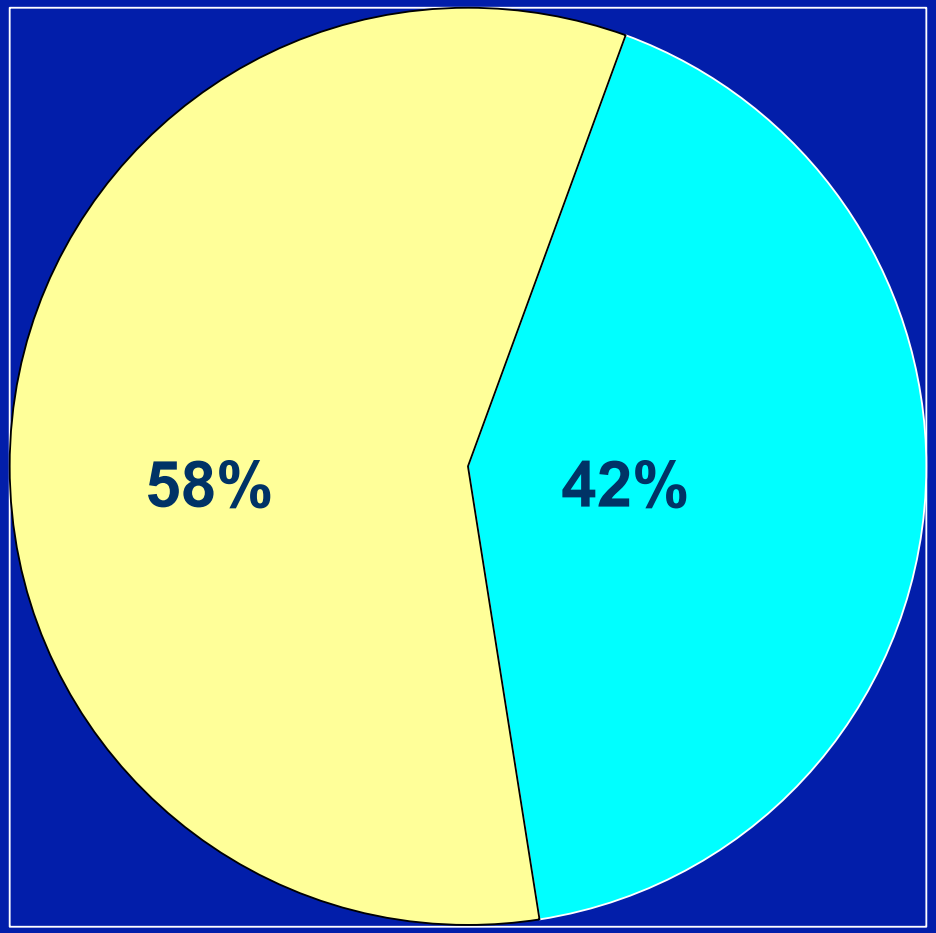
Am Journal of Therapeutics 2009; 16: 300-303

Venous Thromboembolism
The Bad

- Costs of testing
- Cost of treatment
- Reputation of the hospital
- CMS considers VTE a preventable hospital acquired condition



Under use of Prophylaxis Among Hospitalized Patients – The Bad



5451 consecutive patients with acute DVT, 2726 were diagnosed while hospitalized. Only 42% received prophylaxis within the previous 30 days.

Am J Cardiology 2004;93:259-262

Thromboprophylaxis Rates in US Medical Centers: success or failure?

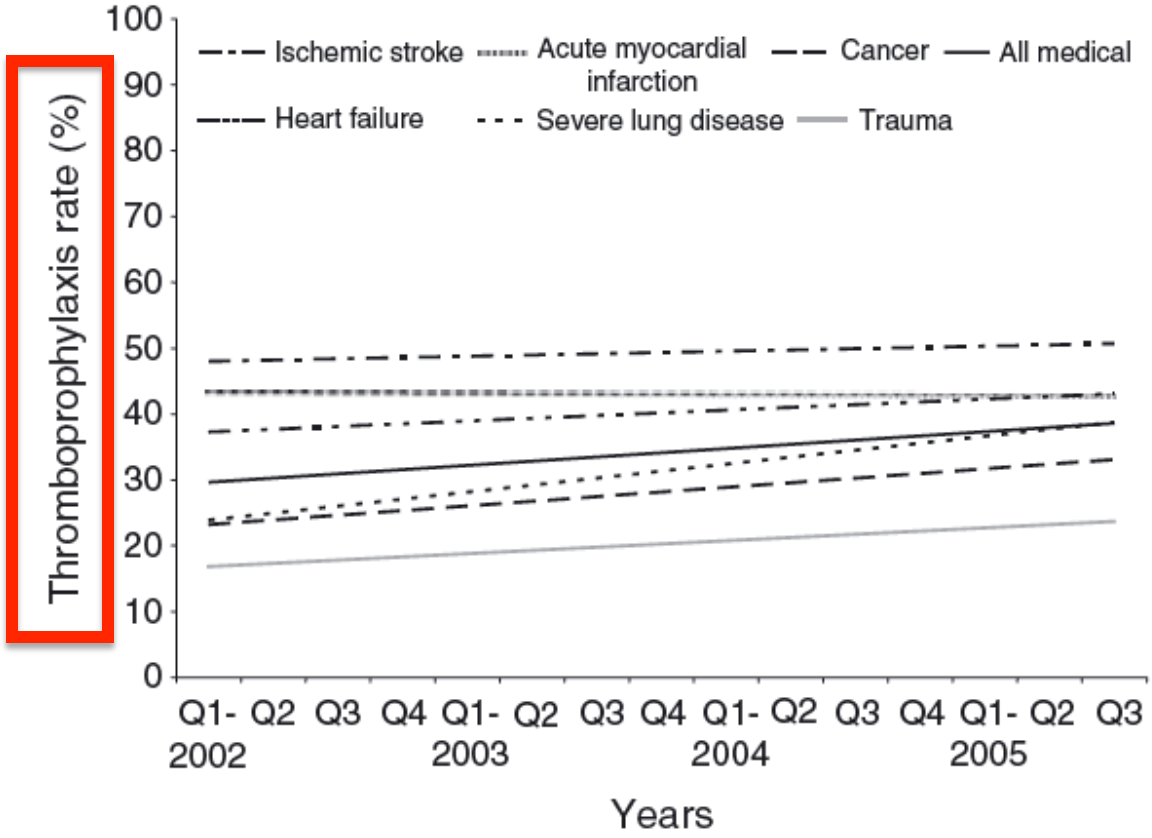


Fig. 2. Adherence to thromboprophylaxis guidelines in at-risk medical patients by calendar quarter.

J Thromb Haemost 2007; 5: 1610-1616

Thromboprophylaxis Rates in US Medical Centers: success or failure?

Table 2 Study population and thromboprophylaxis rates

Discharge group	No. of patients	Any prophylaxis (%)	Appropriate prophylaxis (%)
Total medical patients	196 104	61.8	33.9
Acute myocardial infarction	22 563	95.4	43.0
Heart failure	36 861	72.0	40.1
Ischemic stroke	8962	70.8	49.2
Trauma (without surgery)	9999	64.2	20.3
Cancer	30 708	56.4	27.6
Severe lung disease	86 891	49.8	31.0
Acute spinal cord injury (without surgery)	120	40.8	20.8

J Thromb Haemost 2007; 1610-1616

Journal of HOSPITAL MEDICINE www.journalofhospitalmedicine.com

ORIGINAL RESEARCH

Inpatient Thromboprophylaxis Use in U.S. Hospitals: Adherence to the Seventh American College of Chest Physician's Recommendations for At-risk Medical and Surgical Patients

TABLE 2. Aggregate Any Prophylaxis and Appropriate Prophylaxis Rates by Medical or Surgical Discharge Category

Discharge Group	Any Prophylaxis (%)	Appropriate Prophylaxis (%)
Medical groups	65.9	12.7
Acute spinal injury	81.2	10.0
Burns	36.8	4.7
Cancer	69.4	12.5
Trauma	69.4	17.5
Heart failure	79.8	15.9
Severe lung disease	51.8	10.5
Surgical groups	77.7	16.4
General	66.4	13.3
Gynecological	89.7	7.7
Laparoscopic	79.5	11.3
Orthopedic	93.8	48.6
Urological	66.8	6.3
Neurological	69.8	5.7
Vascular	85.0	19.5
Critical care*	89.9	15.7
Total	71.6	14.5

*The critical care group comprises discharges from all other groups that in addition were flagged for the critical care unit. Appropriate prophylaxis was therefore defined as the prophylaxis appropriate for the discharge primary medical diagnosis or surgical procedure.

TABLE 3. Rates and Reasons of Inappropriate Prophylaxis Within the Entire Study Population per Discharge Group

	Inappropriate Dose (%)	Insufficient Duration (%)	Mechanical Prophylaxis Only (%)	No prophylaxis Ordered (%)
Medical groups	22.7	22.1	8.4	34.1
Acute spinal injury	15.3	26.2	29.7	18.8
Burns*	14.9	12.0	5.1	63.2
Cancer	18.3	22.3	16.3	30.6
Trauma*	12.6	19.7	19.6	30.6
Heart failure	22.1	39.3	1.6	21.1
Severe lung disease	19.5	17.5	3.0	50.0
Surgical groups	13.7	36.1	11.5	22.3
General	10.9	24.5	17.6	33.6
Gynecological	11.8	23.6	46.6	10.3
Laparoscopic	21.4	19.7	27.1	20.5
Orthopedic	39.8	1.6	3.7	6.2
Urological	12.6	24.8	23.0	33.2
Neurological	15.2	16.2	32.7	30.2
Vascular	12.4	51.2	1.9	15.0
Critical care†	14.2	49.4	10.5	10.1

*The trauma and burns groups contains only discharges that did not have surgery.
†The critical care group comprises discharges from all other groups that in addition were flagged for the critical care unit. Appropriate prophylaxis was therefore defined as the prophylaxis appropriate for the discharge primary medical diagnosis or surgical procedure.

65.9% of medical discharges and 77.7% of surgical discharges received at least 1 order for VTE prophylaxis. Only 12.7% of medical discharges and 16.4% of surgical discharges received appropriated prophylaxis

Journal of Hospital Medicine 2009; 4: E15-E21

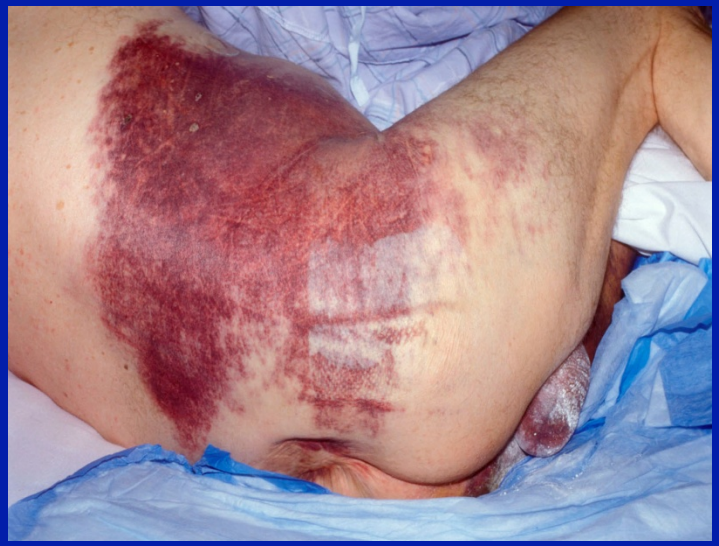
Venous Thromboembolism - *The Ugly*

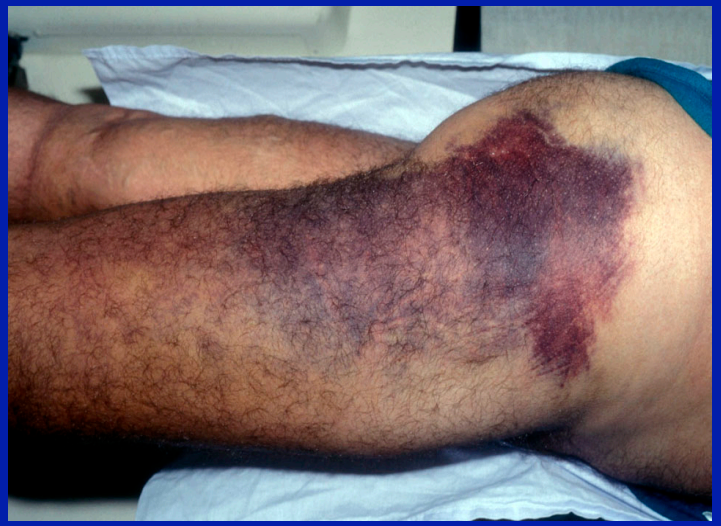

Lee Van Cleef

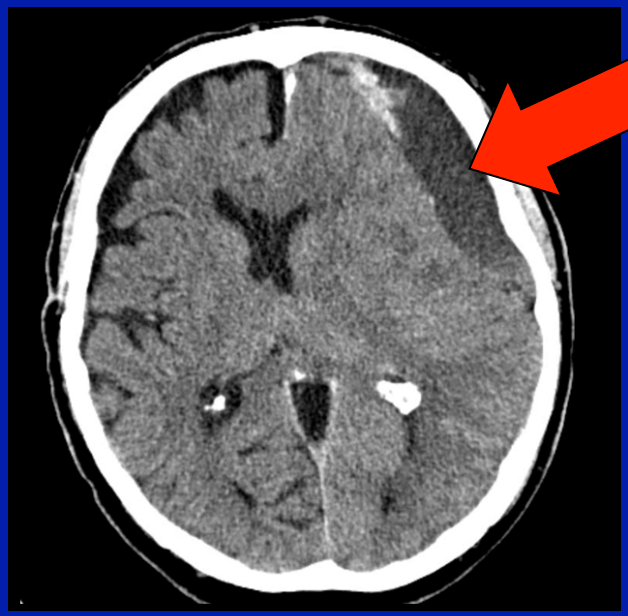
- Complications of anticoagulation
  - Bleeding
  - Heparin-induced thrombocytopenia (HIT)
  - Warfarin-induced skin necrosis
- Long term complications of VTE
  - Postthrombotic syndrome
  - Chronic thromboembolic pulmonary hypertension
  - Recurrence
  - Long term anticoagulation
- Legal issues

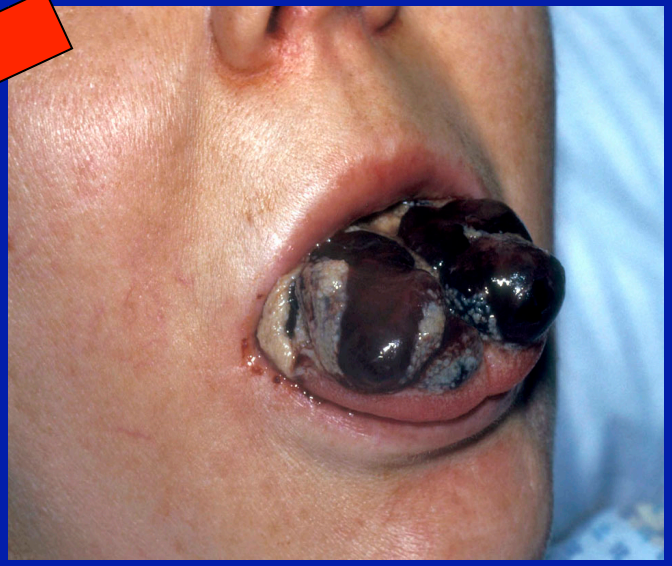
Complications of Anticoagulation

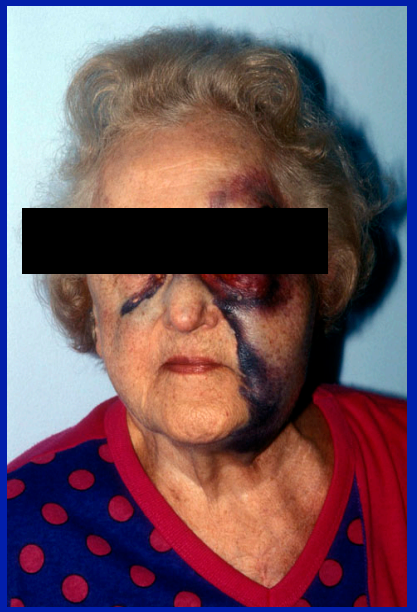
Bleeding – The Ugly





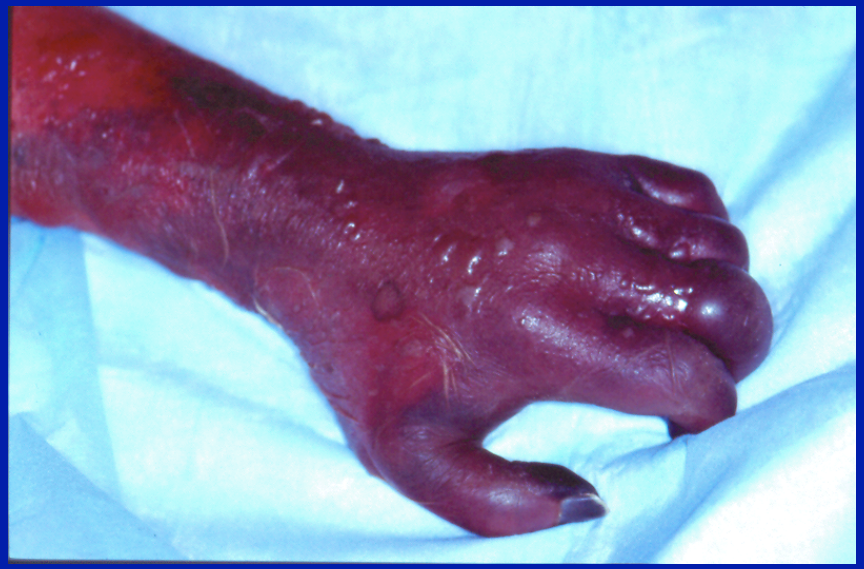


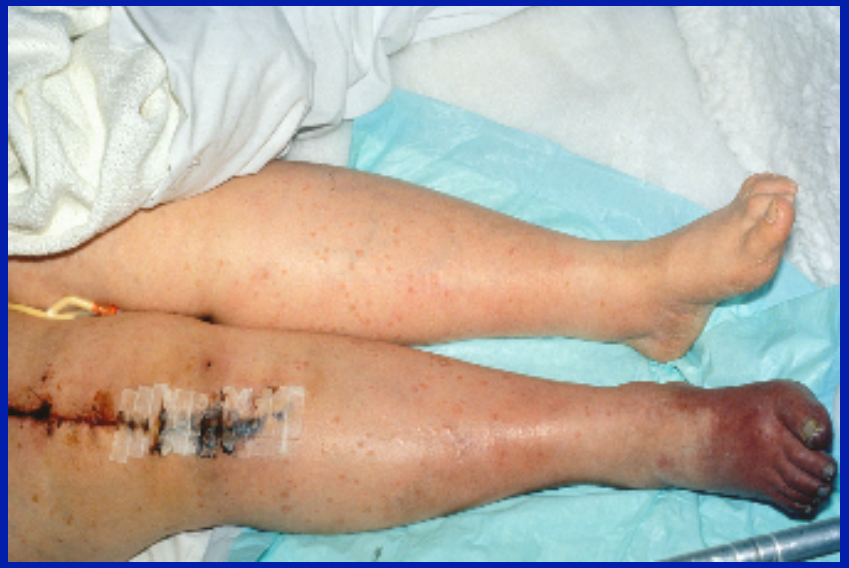


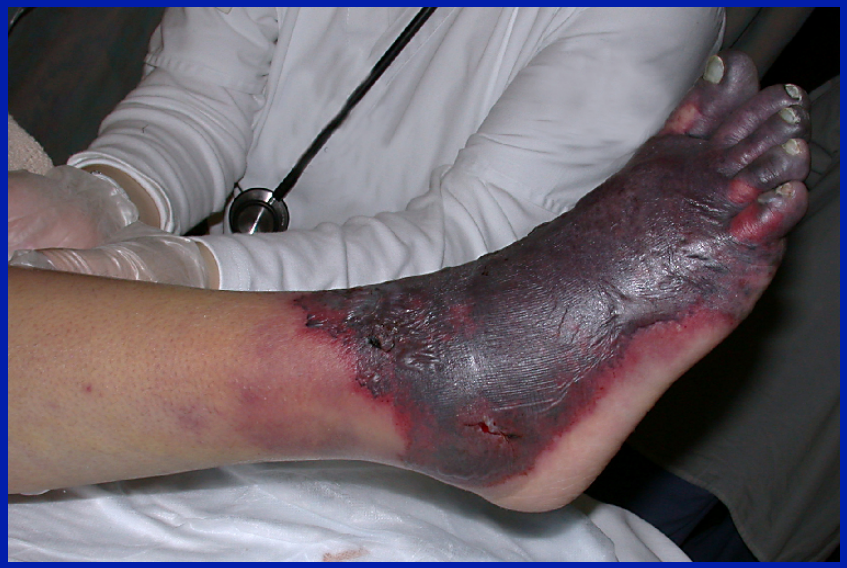


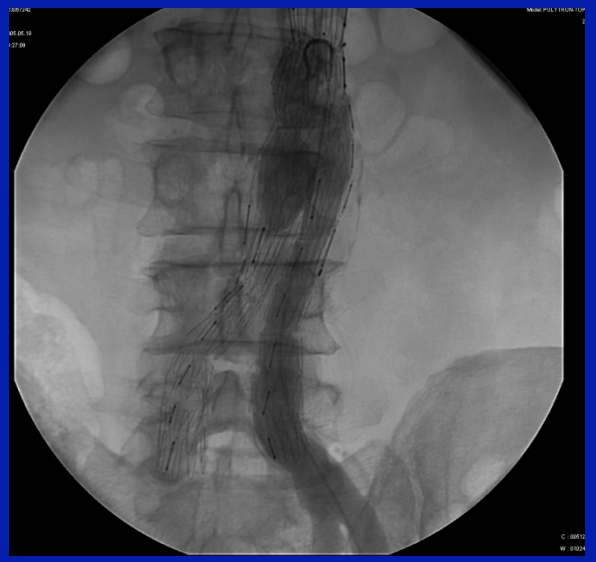
Complications of Anticoagulation

Heparin-induced thrombocytopenia – The Ugly



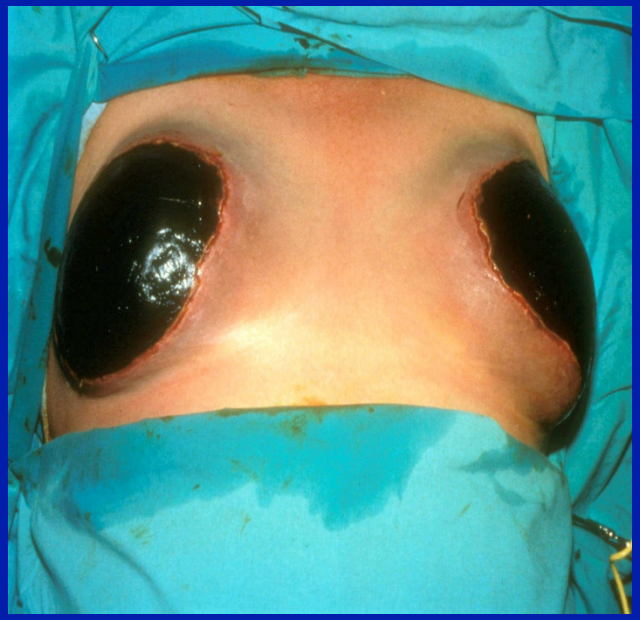


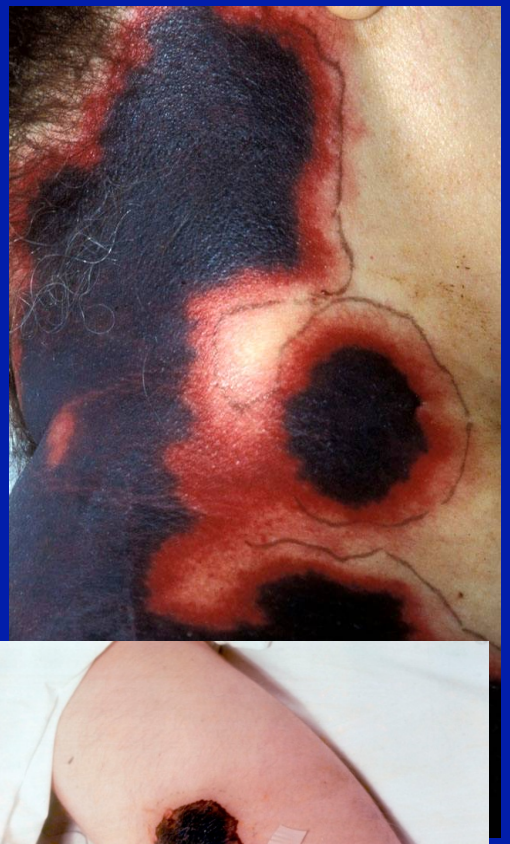


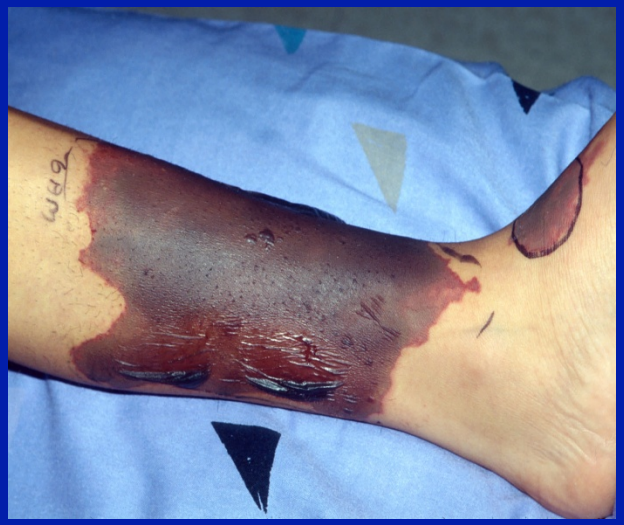


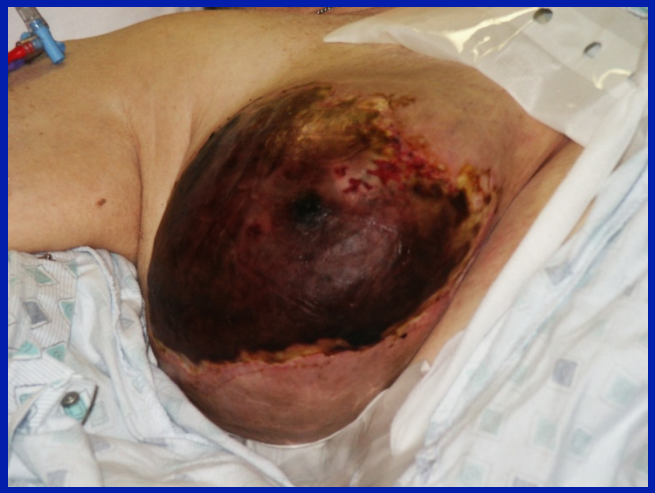
Complications of Anticoagulation

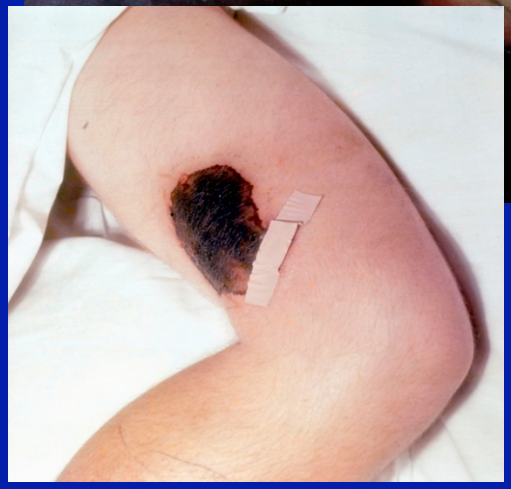
Warfarin-induced Skin Necrosis – The Ugly

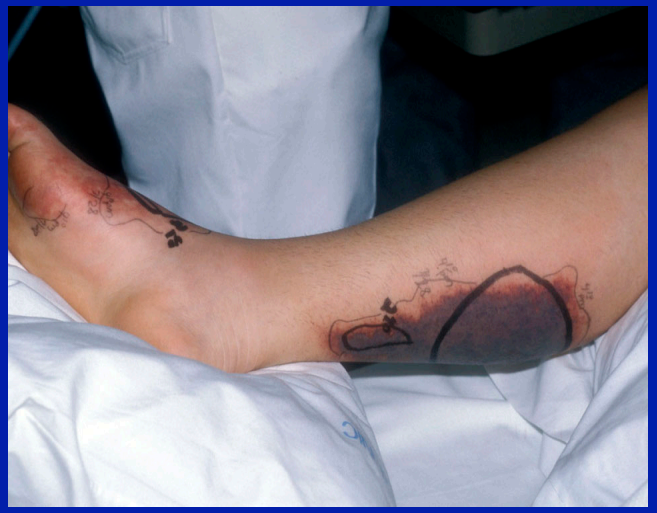






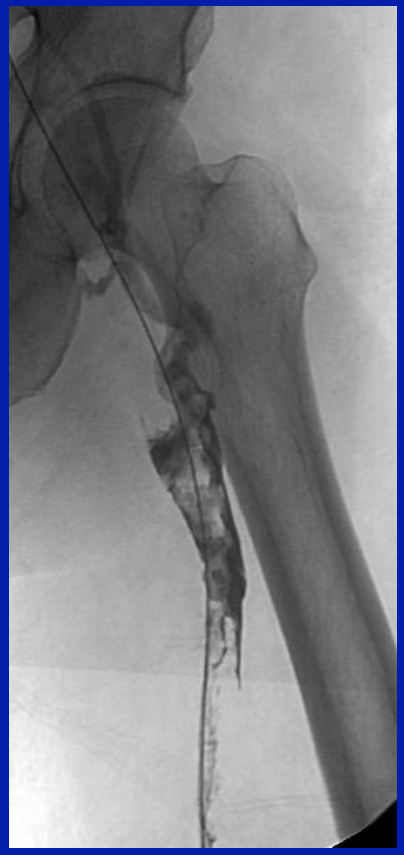




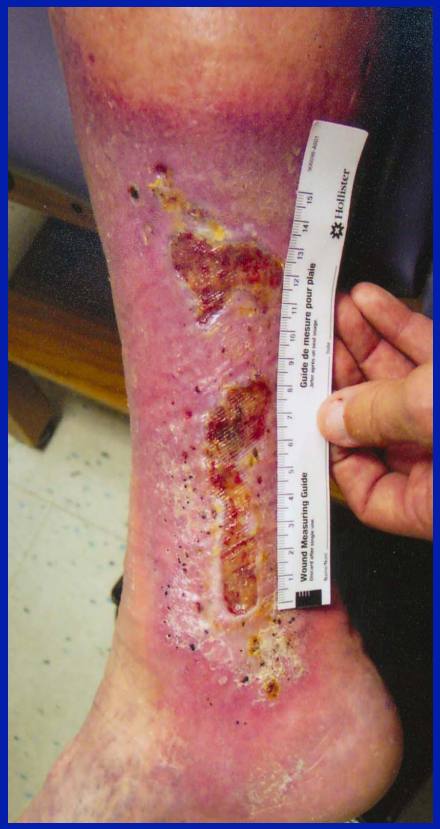


VTE Morbidity and Natural History

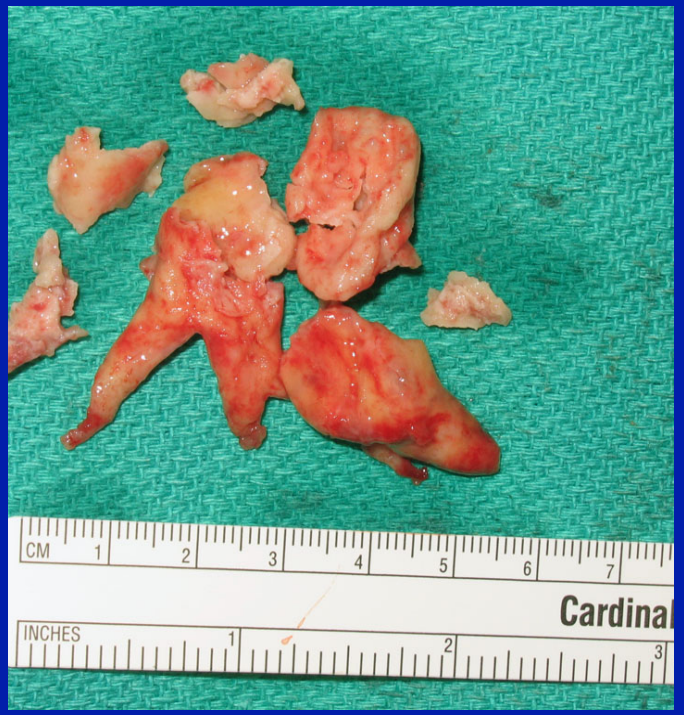
Long Term Complications – The Ugly



Recurrent VTE



Post-thrombotic syndrome



Chronic thromboembolic pulmonary hypertension (CTEPH)

Legal Issues

P&M PULASKI & MIDDLEMAN L.L.C.

Call For a FREE Case Evaluation
1.800.BAD.DRUG

Harmed by The Serious Side Effects of Taking Pradaxa?

You May Be Entitled to Compensation, TIME IS LIMITED.

Serious PRADAXA side effects include cerebral hemorrhaging, internal bleeding and ulcers

Free Legal Consultation

Complete the form below & receive your
FREE legal consultation

First Name

Last Name

Email

Phone

Have you taken Pradaxa? yes ○ no ○

Diagnosed with internal bleeding? yes ○ no ○

Comments

Contact Us Now!

Pradaxa Lawsuit Information

Since the FDA approval, the manufacturer, Boehringer Ingelheim, has acknowledged approximately 260 deaths related to the used of Pradaxa. The personal injury lawyers at Pulaski & Middleman have helped people just like you receive compensation for medical bills, lost wages and other damages caused by pharmaceuticals.

Pradaxa is a prescription blood thinner prescribed in an attempt to prevent blood clotting. Primarily, it is prescribed to those who have a heart rhythm disorder, called atrial fibrillation. Patients with atrial fibrillation have an increased risk of forming blood clots near the heart which can travel through the body causing strokes.

If you or a loved one took Pradaxa and suffered side effects, please contact our law firm for a free consultation.

Call For a FREE Case Evaluation
1.800.BAD.DRUG

AMERICAN BAR ASSOCIATION
Defending Liberty, Pursuing Justice

Venous Thromboembolism

- 3rd most common cardiovascular disease after MI and stroke
- D-dimer an excellent “rule out” blood test”
- Duplex ultrasound the diagnosis of choice for DVT
- Chest CT the diagnosis of choice for PE
- Risk stratification-key to management of PE
- Prophylaxis underutilized (especially in medical patients)