Deep Venous Thrombosis and Pulmonary Thromboembolic Disease: Are we practicing evidence-based medicine? The 2012 ACCP Guidelines and Beyond (Buzz Lightyear)

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Grading Recommendation Strength

• **Grade 1:** Strong Recommendation. Benefits do (or do not) outweigh risks and burdens. Worded as “ACCP Recommends”

• **Grade 2:** Weak Recommendation. Benefits and risks are closely balanced or are uncertain. Worded as “ACCP Suggests”
Grading the Quality of the Evidence

- **Grade A**: High Quality. One or more well designed and executed randomized controlled trials with consistent results, or multiple observational studies with large consistent effects.
- **Grade B**: Intermediate Quality.
- **Grade C**: Low Quality. Small observational studies or randomized controlled trials with multiple limitations.
Which one of the following is **not** a first line recommendation for the initial treatment of an acute DVT or PE?

1. SQ Low Molecular Weight Heparin
2. SQ Fondaparinux
3. SQ Unfractionated Heparin
4. IV Unfractionated Heparin
5. All of the Above are acceptable as first line treatment of an acute DVT.
Answer: All of the above.

- LMWH, IV or SQ weight-adjusted UFH, Fondaparinux (ACCP 1B recommendations) (and most recently, Rivaroxaban), are approved for the treatment of acute DVT and PE.
- Enoxaparin (lovenox) 1.5 mg/kgm once daily is weakly preferred over a dose of 1 mg/kgm twice daily (2C).
- All five options should be used for a minimum of 5 days and INR >=2.0 for at least 24 hrs (1B).
Recommendations among the Four Approved Agents in the treatment of acute DVT or PE

- Hemodynamically Stable: Use LMWH over IV UFH (1B) and over fondaparinux (2C). Use fondaparinux over IV UFH (2B). LMWH vs IV UFH studies show lower mortality, fewer recurrent VTE’s, and less major bleeding.

- Use IV UFH (2B) in patients with persistent hypotension, increased risk of bleeding, severe renal failure (CrCl<30), concerns about SQ absorption (such as obesity or anasarca), or in whom thrombolysis may be performed.
Relative Risk of Major Bleeding

- Definition of Major Bleeding: ICH, Retroperitoneal Hem, or bleeding that leads to death, hospitalization, or transfusion.
- LMWH lower risk than IV UFH (1.2% vs 2.0%).
- LMWH similar to fondaparinux and SQ UFH.
- Protamine reduces bleeding by neutralizing antithrombin activity in all but fondaparinux.
Relative Risk of HIT

- Risk of HIT lower in LMWH than in IV UFH or SQ UFH.
- SQ Fondaparinux has only case reports showing an infrequent association with HIT (causality not proven).
Long-term Treatment of Acute DVT or PE

- Warfarin preferred over LMWH except in patients with malignancy.
- Warfarin or LMWH preferred over Rivaroxaban due to the paucity of experience with Rivaroxaban.
Long-term Treatment of an Acute DVT

- Warfarin should be started on Day 1 (1B). Use 10 mg dose the first 2 days (2C).
- Initial treatment at home over hospital if home circumstances allow (1B).
- Early ambulation over bedrest (2C).
- Asymptomatic DVT should get the same treatment as symptomatic DVT (2B).
- Compressive stockings for 2 years for symptomatic DVT’s to prevent PTS (2B).
Major Bleeding on Warfarin

• Suggest rapid reversal of AC with four-factor prothrombin complex concentrate (Factors IX, II, X, VII/ Bebulin) rather than with FFP (2C).

• Also use vitamin K 5-10 mg slow IV injection (2C).
For how long should warfarin be continued in the treatment of an acute DVT in a patient with a **reversible** risk factor? (provoked DVT)

1. 6 weeks
2. 3 Months
3. 3-6 Months
4. 12 months
5. Indefinite Treatment
Answer: 3 Months

- Warfarin for 3 months has been shown better than warfarin for 6 weeks (1B) in reduction of recurrent VTE and is recommended over longer treatment (1B). Longer treatment is associated with additional bleeding risk w/o reduction in recurrent VTE.

- For first time *unprovoked* DVT: Warfarin for a minimum of 3 months (1A). Continue indefinitely if at low or moderate risk of bleeding (2B). If high risk of bleeding use just 3 months (1B).
Duration of DVT Treatment Continued

• For second time unprovoked DVT use indefinite AC in patients at low risk of bleeding (1B) or moderate risk (2B). If high risk of bleeding just 3 months of AC (2B).
What long-term treatment should be recommended for patients with DVT in the face of a Malignancy?

1. 3 months of warfarin
2. Indefinite warfarin
3. 3 months of LMWH
4. Indefinite LMWH
5. IVC Filter placement
Answer: LMWH indefinitely

- LMWH is suggested over warfarin with Grade 2B evidence.
- LMWH is recommended indefinitely in patients at low to moderate bleeding risk (1B) and in patients at high bleeding risk (2B).
Catheter-Directed Thrombolysis (CDT)

- Considered in patients with extensive acute DVT with SX’s for < 14 days, good functional status and life expectancy, with low risk of bleeding (2B)
- Subsequent treatment same as for patients who did not get CDT (1B)
- Systemic thrombolysis can be used if CDT is not available (2C)
Which of the following is an indication for IVC Filter Placement in a patient with an acute DVT?

1. Contraindication to Anticoagulation (AC)
2. Failure of Anticoagulation
3. Massive DVT
4. Massive PE
5. All of the above
Contraindication to AC has a Grade 1B recommendation.

The other potential indications are commonly employed, but w/o EBM to support them.

Often placed for contraindication of AC, failure of AC, and for massive or submassive PE in whom TPA is not being given.

Give conventional AC when possible (2B).

Do not need AC solely because of the presence of the filter.
Treatment of PE

• In low-risk PE patients with adequate home circumstances suggest home treatment (2B).
In the absence of a high risk of bleeding, thrombolysis is suggested for a PE in which of the following circumstances?

1. Massive PE with hypotension
2. Submassive PE with hypoxemia
3. Submassive PE with severe RV strain on echo
4. Submassive PE with elevated Troponin
5. All of the above circumstances
Answer: Massive PE with hypotension (SBP < 90) (Grade 2C)

- In addition, thrombolysis can be considered in selected patients at “high-risk” for developing hypotension who are at low risk of bleeding (2C).
- Thrombolysis should be given IV, not catheter directed (2C). It is as effective when given by IV as by CDT, with no increased risk of bleeding, and with a lower risk for mechanical complications.
- 2 hr infusion time recommended (2C).
Treatment of PE with Thrombolytics

- Metanalysis of 748 patients from 11 randomized controlled trials of AC plus Lytic vs AC alone.
- Lytic with trend toward reduction in recurrent PE, all-cause mortality, increase in major bleeding.
- 5 of these trials with more severe PE: significant decrease in mortality (6.2% vs 12.7%) and increase in major bleeding (21.9% vs 11.9%).
Treatment of PE with Lytics

- Positive Effects of Lytics: accelerated clot lysis, decrease in PA pressures, normalization of RV function.
- High risk patients where can consider Lytics: marked dyspnea and low sats, elevated troponin (indicative of RV microinfarction), RV dysfunction on echo, RV enlargement on Chest CT.
Treatment of PE

• When should IR catheter extraction or fragmentation, or surgical embolectomy be considered in Acute PE?
• What is the level of evidence for this?
Treatment of PE

• In patients with PE causing hypotension and major contraindication to thrombolytic, or insufficient time to wait for thrombolytic effect, and appropriate expertise is available.

• 2C.
Treatment of PE

- When should an IVC Filter be placed?
Treatment of PE

- If AC is contraindicated (1B).
- Conventional course of AC should be resumed when possible (2B).
Treatment of PE

• Duration of Therapy with coumadin or LMWH is the same as for DVT.
Upper Extremity DVT

• What is recommended for the initial treatment of an acute UE DVT?
• Should CDT be given?
Upper Extremity DVT

- LMWH, IV or SQ UFH, or fondaparinux followed by warfarin for 3 months (1B).
- Only consider catheter directed thrombolytic in patients with low risk of bleeding and severe symptoms of recent onset (2C).
Upper Extremity DVT

• When should a SVC Filter be considered?
• How long should coumadin be used?
• Should the CVP be removed?
Upper Extremity DVT

- Consider filter if AC contraindicated and there is clear evidence of DVT progression or clinically significant PE (2C).
- Warfarin for 3 months (1B) similar to Reversible cause of a LE DVT.
- Do not remove CVC if it is still needed (2C). Keep AC going as long as catheter is in place (1C with cancer, 2C without).
Heparin-induced Thrombocytopenia

- **HIT-1**: Non-immune mediated small fall in platelet count within the first 2 days of starting heparin. Of no clinical significance. Do not need to stop Heparin.

- **HIT-2**: Immune Mediated with antibodies against Heparin. 2.6% incidence with UFH vs only 0.2% with LMWH.
When should a diagnosis of HIT-2 (HIT) be expected?

Received Heparin within the past 2 weeks (most typically within 5-10 days after initiation of Heparin therapy) and Platelet count drop >= 50% or Thrombotic event between days 5-14 of heparin initiation (1C)
Treatment of HIT

- Treatment with bivalirubin or argatroban. (Fondaparinux can be considered for off label use).
- HIT and cardiac surgery: delay surgery if possible. Otherwise use bivalirubin (2C).
- HIT and needing PCI: use bivalirudin (2B).
- HD patients with h/o HIT should get citrate rather than heparin (2C).
D-Dimer Assay

• More than a half dozen different assays are available to measure the D-Dimer.

• For the quantitative assays a D-Dimer level > 500 ng/ml is considered abnormal.

• Good sensitivity and NPV for DVT/PE. Sensitivity 95% by quantitative rapid ELISA (30 min test).

• Poor specificity and PPV. Normal in only 40-70% of patients without PE.
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### Score

- **High probability**: 3 or greater
- **Moderate probability**: 1 or 2
- **Low probability**: 0 or less

**Modification:**

This clinical model has been modified to take one other clinical feature into account: a previously documented deep vein thrombosis (DVT) is given the score of 1. Using this modified scoring system, DVT is either likely or unlikely, as follows:

- **DVT likely**: 2 or greater
- **DVT unlikely**: 1 or less

D-Dimer Testing is Recommended in which of the Following Circumstances?

1. Patient with a moderate pre-test probability of DVT.
2. Patient with a high pre-test probability of DVT.
3. Patient with a high pre-test probability of PE.
4. None of the above.
5. All of the above.
Answer: Patient with a moderate pre-test prob for DVT

- Low or moderate prob of DVT: check D-dimer. If negative no further w/u is needed (1B). If positive get an US.
- High prob of DVT: check US. If US positive then treat.
- High prob of DVT: If US negative then check D-dimer. If D-dimer positive repeat US in one week.
**USE OF NEWER AGENTS: FDA APPROVAL**

- **Abixiban** (Oral Factor Xa inhibitor): Non-valvular Afib.
- **Edoxaban** (Oral Factor Xa inhibitor): None.
- **Dabigatran** (Oral Direct Thrombin Inhibitor): Non-Valvular Afib.
USE OF NEWER AGENTS: FDA APPROVAL

• **Fondaparinux (SQ Factor Xa Inhibitor):** Acute DVT/PE, Hip/Knee/Abdominal Surgery prophylaxis.

• Argatraban (IV Direct Thrombin Inhibitor): HIT, Coronary Thrombosis in patients with HIT or high risk of HIT.
USE OF NEWER AGENTS: FDA APPROVAL

- Bivalirudin (IV Direct Thrombin Inhibitor): HIT, ACS for PCI
- Aspirin: What’s old is new again (again!)
Rivaroxaban (Xarelto)

- **Mechanism:** Oral Direct Factor Xa inhibitor.
- **Administration:** Fixed dose. No lab monitoring required.
- **Half-life:** 5-9 hrs. Peak plasma concentration in 2.5 to 4hrs. Monitoring not needed.
Rivaroxaban FDA Approval

- Prophylaxis in elective Hip and Knee surgery (10 mg PO daily).
- Treatment of acute DVT and acute Pulmonary Embolism (15 mg PO BID).
- Prevention of recurrence after episode of acute DVT and acute PE (15 mg PO BID). Equal efficacy as Warfarin and possibly less bleeding risk (BMJ metanalysis 2012).
- Stroke prevention in non-valvular Atrial Fibrillation.
- Not recommended in patients with CrCl under 30 ml/min, significant hepatic dysfunction, or pregnant.
EINSTEIN-PE Investigators
(NEJM 2012:366:1287)

- 4832 patients with symptomatic PE randomly assigned to rivaroxaban (15 mg BID for 3 wks and then 20 mg daily) vs enoxaparin (1 mg/kgm BID and then warfarin).

- Results: Risk of recurrent VTE the same (2.1 vs 1.8%), but risk of major bleeding less (1.1 vs 2.2%, but absolute benefit only 1.1%).

- Limitations: open-label study could increase the risk for bias.
Rivaroxaban

- Half life with normal renal function is only 5-9 hours. In non life-threatening bleeds discontinuation may be sufficient.
- No specific antidote exists.
- Activated Charcoal may remove unabsorbed drug from the GI tract.
- Dialysis not effective, but charcoal hemofiltration has been suggested.
- Life-threatening bleeding: Activated prothrombin complex concentrates (bebulin) has been suggested.
- Potential for use in patients with HIT.
Rivaroxaban for Prophylaxis in Medical Patients (NEJM Feb 2013)

- Placebo controlled trial with 8101 patients randomized to Rivaroxaban 10 mg PO daily vs Enoxaparin 40 mg SQ daily.
- Rivaroxaban was non-inferior in prevention of VTE, but there was an increased risk of bleeding.
APIXABAN

- Oral Factor Xa inhibitor.
- Half-life 8-15 hours.
- FDA approved for non-valvular A Fib.
- Approved in Europe for prophylaxis after hip or knee surgery.
- No antidote available.
Apixaban for Extended Treatment of Venous Thromboembolism (NEJM Feb 2013)

- 2486 patients in this randomized double-blind study of patients with VTE treated for 6-12 months with AC were randomized to placebo vs apixaban 2.5 mg BID (prophylactic dose) vs apixaban 5 mg BID (treatment dose) for an additional 12 months.
- Rate of VTE recurrence or VTE related death 8.8% vs 1.7% vs 1.7%.
- No difference in major or non-major bleeding.
- Not yet FDA approved for this indication.
Oral Abixaban for the Treatment of Acute Venous Thromboembolism (NEJM Aug 2013)

- 5395 patients with acute VTE double blind RCT Abixaban for 6 months vs enoxaparin/warfarin for 6 months.
- Abixaban was noninferior to enoxaparin/warfarin in the primary safety outcome of recurrent symptomatic VTE or death from VTE.
- Abixaban significantly less major bleeding and clinically relevant non-major bleeding.
- Not yet FDA approved.
Edoxaban vs Warfarin for extended treatment of Symptomatic VTE
(NEJM October 2013)

- Edoxaban is an oral factor Xa inhibitor (similar to rivaroxaban). Not yet FDA approved.
- Randomized, double-blind, noninferiority trial of patient with VTE who received heparin initially and were then randomized to edoxaban 60 mg daily (30 mg daily for CrCl 30-50 or weight under 60 kgm) vs warfarin for 3-12 months.
- Warfarin therapeutic range 63.5% of the time (40-50% in most reports).
- Conclusion: Edoxaban noninferior to warfarin and caused significantly less bleeding (8.5 vs 10.3%).
Dabigatran (Pradaxa)

- Orally active direct thrombin inhibitor.
- Only Approved by the FDA for prophylaxis in non-valvular atrial fibrillation with CrCl over 30 ml/min.
- Half-life 12-14 hrs. Maximum AC effect in 2-3 hours.
- Drug interactions: rifampin, quinidine, ketoconazole, verapamil, amio, clari.
Dabigatran Studies

• Dabigratan 220 mg daily non-inferior to Enoxaparin 40 mg daily for prophylaxis after TKA or THA (Throm Haemost 2009;101:77).

• RE-COVER (NEJM 2009;361:2342): Randomized, Double blind, noninferiority trial of 2539 pts with acute VTE showed Dabigatran=Warfarin for 6 months in recurrent VTE, and in associated death and all bleeding and major bleeding. However, the substantial majority of these patients had DVT’s, not PE’s.

• Cost approx $8/day.
Dabigatran Drug Reversal

- Half-life only 12-14 hrs.
- Hemodialysis: up to 60% removed in 2-3 hrs.
- Activated Charcoal removes unabsorbed drug in GI tract within 2 hrs of ingestion.
- Recombinant Factor VII A supported by limited data to reverse AC effect.
- Monoclonal AB capable of rapidly and completely inhibiting AC actively in a mouse model is being studied.
EXTENDED USE OF DABIGATRAN IN VTE (NEJM Feb 2013, TWO STUDIES)

- Patients completed at least 3 months of warfarin were randomized to dabigatran vs warfarin in one study, and dabigatran vs placebo in the other. Total duration of dabigatran 6-36 months.
- Dabigatran non-inferior to warfarin in recurrent VTE (1.8% vs 1.3%) and lower risk of major bleeding (0.9% vs 1.8%). However, increased risk of ACS (0.9% vs 0.2%).
- Dabigatran vs placebo study: Less recurrent VTE (0.4% vs 5.6%), increased risk of bleeding (5.3% vs 1.8%). ACS the same.
Dabigratan: Risks

- **Bleeding**: US FDA and European Medicines Agency are investigating over 250 post-marketing reports of deaths due to bleeding. Median patient age is 80.

- **MI or ACS**: Metanalysis (Arch Intern Med 2012;172:397) of 7 randomized trials comparing dabigatran vs warfarin, enoxaparin, or placebo showed increased risk of MI or ACS (OR 1.19 vs. 0.79). Risk similar in the largest of these trials (RE-LY) showed an OR of 1.27.

- **Mechanical Heart Valves compared to warfarin**: NEJM 9/1/13. Trial terminated prematurely due to excess of thromboembolic and bleeding events in the dabigatran group.
Fondaparinux (Arixtra)

- Synthetic pentasaccharide given SQ with inhibitory activity against Factor Xa.
- 100% bioavailable, peak level 1.7 hrs.  Half-life 17 hrs.
- Can Monitor anit-factor Xa levels.
- FDA approved for DVT with similar efficacy and S/E’s at 3 months as Enoxaparin.
- FDA approved for acute PE with efficacy and safety similar to IV Heparin.
Fondaparinux

Doses: prophylaxis 2.5 mg SQ daily.
   treatment 5-10 mg SQ daily weight based.
Clearance: Renal.
Cautions: Under 50 kgm weight, CrCl < 30, plts < 100
Preop: stop 2-4 days in advance. Longer with renal dysfunction.
HIT: reports of effectiveness off-label.
Bleed: no antidote. High dose recombinant Factor VIIa (Novo-7) partially normalizes the PTT>
Argatroban

- Intravenous Direct Thrombin Inhibitor.
- Immediate onset of action. Steady state AC effect achieved in 1-3 hours. Very short half-life, effect wears off rapidly after discontinuation.
- FDA approved for HIT and for coronary thrombosis in patient with, or at risk for, HIT.
- Hepatic elimination, so avoid in the presence of liver failure.
Bivalirudin

- Intravenous Direct Thrombin Inhibitor.
- Approved by the FDA for use in patients with ACS undergoing PCI, and for HIT.
- Predominantly non-organ elimination by proteolysis and thus can be use in liver or renal dysfunction.
- Half-life of only 25 minutes.
Low-dose Aspirin after completion of treatment for VTE (ASPIRE STUDY, NEJM May 24 2012)

- Study of 800 patients with first episodes of unprovoked VTE. Aspirin given after completing course of warfarin.
- Primary Study Endpoint: Aspirin 100 mg daily was no better than placebo at preventing recurrent VTE up to a median f/u of 3 years (4.8% vs 6.5%).
- Secondary Endpoint: composite risk of a major vascular events (VTE recurrence, MI, Stroke, major bleeding, and death) were reduced by about 1/3.
WARFASA STUDY: NEJM May 2012

• First time unprovoked DVT who had finished 6-18 months of AC, who were randomized to ASA 100 mg vs placebo.

• 6.6% recurrence rate in ASA group compared to 11.2 % in placebo group.

• No increase rate of major bleeding

• Summary of the two studies: Indefinite warfarin in this population substantially lowers the risk of recurrent VTE, but increases bleeding risk. ASA may be another alternative in this group of patients.
QUESTIONS OR COMMENTS?
ACCP Guidelines for Hospital Thromboprophylaxis of Medical Patients

• What drugs are recommended?
• When should SCD’s be used?
Hospital Thromboprophylaxis

- LMWH, LDUH (BID or TID), or fondaparinux (1B). In ICU patients use LMWH or LDUH (2C).
- Use SCD’s or graduated compression stockings if high risk of bleeding instead of the above (2C).
VENOUS THROMBOLISM PROPHYLAXIS IN HOSPITALIZED PATIENTS: A CLINICAL PRACTICE GUIDELINE FROM THE AMERICAN COLLEGE OF PHYSICIANS

Ann Intern Med. 1 November 2011:155(9):625-632

Note: guidelines refer to hospitalized medical (not surgical) patients
Heparin vs no Heparin in non-stroke medical patients

- Randomized trials of Heparin vs no Heparin prophylaxis in non-stroke medical patients did not show a significant reduction in mortality or in symptomatic DVT.
- There was an increased risk of all bleeding events (9 more events per 1000 persons treated). Non-significant increase in major bleeding (1 per 1000).
- There was a significant reduction in PE’s (4 fewer PE’s per 1000 persons treated). In most patients this was felt to outweigh the increased bleeding risk.
- Overall, the ACP recommends Heparin prophylaxis be used in medical patients unless a substantial contraindication exists.
Heparin vs no Heparin in acute Stroke Patients

- Heparin increased the risk of major bleeding (6 per 1000). This was felt to outweigh a non-significant reduction in PE’s (3 per 1000).

- Heparin had no significant effect on mortality, symptomatic DVT, or PE.

- “However, the pooled results showed wide CI’s that also encompassed potential substantial net benefits.”
The International Stroke Trial  
(Lancet. 1997:349:1569-1581)

- No significant difference between SQ Heparin vs no Heparin in 14 day mortality or in PE’s.
- Increase in major bleeding (increase 5 in 1000) was offset by a larger decrease in risk for recurrent ischemic stroke (decrease 14 in 1000).
- Overall, while evidence for benefit in stroke patients is relatively weaker than for that in non-stroke medical patients, the ACP does recommend prophylaxis in stroke patients who are not at high risk of bleeding.
SQ UFH (2-3 times daily) vs SQ LMWH (once daily)

- No significant difference in clinical outcome.
- No significant difference in major bleeding.
- There was a Non-significant trend favoring LMWH over UFH for preventing PE.
- HIT: 7/1900 UFH vs 1/1900 LMWH (p=0.07).
- Wholesale drug cost: UFH $10/day, generic enoxaparin ($35/day), fondaparinux ($60/day).
- Fondaparinux has not been compared directly to heparin products for prophylaxis.
Graduated Compression Stockings in Patients with Acute Stroke

- No improvement in Clinical Outcome.
- Increased risk for lower extremity skin damage.
- Overall, the ACP recommends against the use of graduated compression stockings.
Intermittant Pneumatic Compression

- Shown beneficial in surgical patients.
- Thus, the ACP feels it may be a reasonable option in medical patients at high risk for bleeding or patients in whom heparin is contraindicated for other reasons.
Treatment of Chronic Thromboembolic Pulmonary Hypertension

- What medication is recommended?
- When is pulmonary thromboendarterectomy recommended?
Treatment of CTPH

- Lifetime treatment with Warfarin (1B).
- Thromboendarterectomy is recommended in patients with CTPH with central disease with experienced surgical expertise available (2C).
Treatment of SVT

• Are there any recommendations or suggestions for treatment?
Treatment of LE SVT

- Treatment is suggested if SVT is at least 5 cm in length with prophylactic dose of LMWH or fondaparinux for 45 days (2B).
Acute Isolated LE Distal DVT

- If no severe symptoms or risk factors for extension suggest serial US for 2 weeks and treat if extend to be proximal DVT.
- If severe symptoms or risk factors for extension the give AC for 3 months (not longer).
Splanchnic Vein Thrombosis

- Portal vein, mesenteric vein, or splenic vein with symptoms give AC (1B). Hepatic vein with symptoms give AC (2C).
- Incidentally detected portal, mesenteric, splenic or hepatic no AC (2C).
Prophylaxis in Outpatients with Malignancy

- Recommend against routine use of prophylactic LMWH or LDUH (2B) or warfarin (1B) unless the patient has another risk factor (such as prior VTE, immobilization, hormonal therapy, etc).
- With indwelling catheter recommend against prophylaxis with LMWH or LDUH (2B) or warfarin (2C) unless there is another risk factor.
Prophylaxis in chronically immobilized patients

- Residing at home or nursing home is not recommended (2C).
D-Dimer Testing is Recommended in which of the Following Circumstances?

1. Patient with a moderate pre-test probability of DVT.
2. Patient with a high pre-test probability of DVT.
3. Patient being worked up for a PE.
4. None of the above.
5. All of the above.
Answer: Patient with a moderate pre-test prob for DVT

- Low or moderate prob of DVT: check D-dimer. If negative no further w/u is needed (1B). If positive get an US.
- High prob of DVT: check US. If US positive treat.
- High prob of DVT: If US negative check D-dimer. If D-dimer positive repeat US in one week.
### Pretest probability of deep vein thrombosis (Wells score)

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- **High probability**: 3 or greater
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### Modification:

This clinical model has been modified to take one other clinical feature into account: a previously documented deep vein thrombosis (DVT) is given the score of 1. Using this modified scoring system, DVT is either likely or unlikely, as follows:

- **DVT likely**: 2 or greater
- **DVT unlikely**: 1 or less