The home study portion is designed to provide a comprehensive foundational knowledge to the participant so that they can engage in the subsequent didactic and interactive case-based program.

At the conclusion of the self study, participants should be better able to:

1. Describe and explain the basic aspects of the coagulation cascade.
2. Define thrombogenesis and hemostasis.
3. Describe hemostatic mechanisms and apply this knowledge to patient management.
4. Compare and contrast the pharmacology, pharmacokinetics and pharmacodynamics of anticoagulant agents:
   a. Vitamin K antagonists (VKA)
   b. Direct Thrombin Inhibitors (DTI)
   c. Heparin and heparin like agents
   d. Anti-Xa agents
5. Compare and contrast the pharmacology, pharmacokinetics and pharmacodynamics of the antiplatelet agents:
   a. Aspirin,
   b. P2Y12 inhibitors
   c. Vorapaxar
   d. Cilostazol
   e. Dipyridamole/ASA
   f. IIB/IIIA inhibitors
6. Compare and contrast the pharmacology, pharmacokinetics and pharmacodynamics of the thrombolytic agents:
   a. Alteplase
   b. Tenecteplase
7. Describe the basics of warfarin dosing and monitoring.
8. Define the current recommendations for indication-specific intensity and duration of warfarin therapy.
9. Identify risk factors for thromboembolism.
10. Discuss therapeutic treatment strategies for the prevention and treatment of venous thromboembolism.
11. Identify the anticoagulation needs of atrial fibrillation patients.
12. List the drug therapies needed in different stroke stages; acute stroke, peri-stroke period and secondary prophylaxis.
13. Describe the pathophysiology of atherosclerosis and acute coronary syndromes and relate this back to the antithrombin and antiplatelet agents used to manage this disorder.
14. Identify the onset of heparin induced thrombocytopenia and develop treatment strategies.
15. Interpret strategies used to manage hemorrhagic complications associated with anticoagulant and antiplatelet agents.
16. Be able to determine a peri-procedural anticoagulant regimen for patients based upon indication for anticoagulation and risk factors.

Be advised, although the primary reference is the ACCP 2012 guidelines in Chest, there may be other readings the participant is referred to, these will be specifically indicated in each section. The materials are all provided in a PDF format for each section. These materials are to assist you in completing the home study guide and the examination. A copy of the participant’s completed self-study guide must be submitted on the 1st day of the live programming. After completing these sections, the participant will be required to complete the self-study open book test. The test must be completed by no later than October 31, 2014. The home study portion must be completed in order to participate in the live program. A passing score of 70% must be achieved on the self-study online exam. Those failing to achieve this score will be contacted prior to the program for discussion and remediation.

1. Describe and explain the basic aspects of the coagulation cascade.
2. Define thrombogenesis and hemostasis.
3. Describe hemostatic mechanisms and apply this knowledge to patient management.

Readings for the Home Study Guide (link below or provided as pdf)

QUESTIONS:
Describe Virchow’s triade and its relationship to thrombosis.

Appreciate the differences in the pathophysiology of arterial and venous thrombosis

Define the aspects of clot initiation, propagation and amplification.

Identify the role of Factor VII and tissue factor in clot formation

What are our body’s “natural” anticoagulants?
4. Compare and contrast the pharmacology, pharmacokinetics and pharmacodynamics of anticoagulant agents:
   a. VKA  b. DTIs  c. Heparin and heparin like agents  d. Anti-Xa agents

5. Compare and contrast the pharmacology, pharmacokinetics and pharmacodynamics of the antiplatelet agents:

6. Compare and contrast the pharmacology, pharmacokinetics and pharmacodynamics of the thrombolytic agents:
   b. Alteplase  b. Tenecteplase

Readings for the Home Study Guide
1. New Antithrombotic Drugs CHEST ACCP guidelines, 9th ed. 2012;141(2_suppl):e120S-e151S
5. Refer to appendix A of this home study for review of warfarin metabolism

Recommended Readings  Anticoagulation Therapy: A Point-of-Care Guide Chapter 2-7 and 9 and 18

<table>
<thead>
<tr>
<th>Agent</th>
<th>Classification</th>
<th>Site of action</th>
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Ticagrelor
Cilostazol
Vorapaxar
Abciximab
Eptifibatide
Tirofiban
Alteplase
Tenecteplase

**QUESTIONS:**

List some of the advantages of low-molecular weight heparin (LMWH) over UFH.

Know each product’s FDA approved indication and corresponding dosing.

Know the impact of obesity and renal dysfunction on each of the agents.

What are the recommendations for validating a therapeutic range for Unfractionated Heparin (UFH) for an institution?
7. Describe the basics of warfarin dosing and monitoring.
8. Define the current recommendations for indication-specific intensity and duration of warfarin therapy.

**Readings for the Home Study Guide (link below or provided as pdf)**

1. Oral Anticoagulants CHEST. 2012;141(2_suppl):e44S-e88S
2. Evidenced Based Medicine of Anticoagulant Therapy, CHEST. 2012;141(2_suppl):e152S-e184S
3. Refer to appendix A of this home study for review of warfarin metabolism

**Recommended Readings**


**QUESTIONS:**

List the vitamin K dependent clotting factors that warfarin interferes with and their respective half-lives.

Describe how warfarin exerts it’s pharmacologic effect. (focus on the difference between anticoagulant and antithrombotic effect)

What two reasons do we overlap UFH/LMWH/fondaparinux with warfarin for?

How do we monitor warfarin for efficacy?

What is the most common target range for warfarin?

Describe the metabolism of warfarin and indicate the rationale behind the stereo-specific drug interactions.

Indicate factors that are associated with an increased risk of bleeding while on warfarin.

What is the recommended INR monitoring for VKA?

What is the typical % dosage change that is made to warfarin (either up or down)?
Discuss the genetic polymorphisms of the cytochrome P450 2C9 and VKOR1 and their resultant effects on response to warfarin.

What is the pathology behind the following side effects of warfarin and how would you manage each episode?:

a. purple toe syndrome

b. warfarin induced skin necrosis: aka WISN or CISN (Coumadin induced skin necrosis)

Discuss the teratogenicity of warfarin and utility/safety in any stage of pregnancy.

9. Identify risk factors for thromboembolism.
10. Discuss therapeutic treatment strategies for the prevention and treatment of venous thromboembolism.
11. Discuss the utilization of thrombolysis for treatment of DVT and/or PE.

Readings for the Home Study Guide (link below or provided as pdf)
3. Prevention of VTE orthopedic. CHEST. 2012;141(2_suppl):e278S-e325S
4. Antithrombotic Therapy for VTE Disease CHEST. 2012;141(2_suppl):e419S-e494S
5. Evidenced Based Medicine of Anticoagulant Therapy, CHEST. 2012;141(2_suppl):e152S-e184S

Recommended Readings

QUESTIONS:
Use the following case to answer questions 1-6:

RT is a 67 yo male patients admitted to hospital for community acquired pneumonia (CAP) and chronic obstructive pulmonary disease (COPD) exacerbation and hypertension. His medications upon admission include: spiriva 1 capsule inhaled qday, Advair 50-250 1 puff BID, MVI 1 qday, lisinopril/HCTZ 20/25 1tab qday and calcium 500 elemental qday. He has varicose veins, weight is 287 lbs, HT=5’10”, history of phlebitis.

1. What is the PADUA score?

2. List RT’s risk factors for developing a deep vein thrombosis while in hospital.

3. Is RT a candidate for DVT prevention and if so list all available options and expected efficacy of each.

4. RT develops a DVT and PE while in hospital, provide therapeutic recommendations to manage this event, one using UFH and the other using LMWH and when and what dose to begin warfarin with and recommendation for how long to overlap therapy.

5. The recommended duration of warfarin therapy for RT would be, justify your answer:

6. The recommended target INR would be:
   a. 1-2
   b. 1.5-2
   c. 2-3
   d. 2.5-3.5

Be able to determine which patients may be candidates for outpatient therapy.

What is the role of thrombolytics for treatment of acute PE? What about DVT?

What is an IVC filter and reflect on whether you have ever seen them used. Further discussion during live portion of program.

12. Identify the anticoagulation needs of atrial fibrillation patients.
### Readings for the Home Study Guide (link below or provided as pdf)


### Recommended Readings


### QUESTIONS

<table>
<thead>
<tr>
<th>Question</th>
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<tbody>
<tr>
<td>What are the differences/commonalities for the following types of atrial fibrillation: paroxysmal, persistent, permanent, lone or postoperative?</td>
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<td>What is the difference between rhythm control and rate control?</td>
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<td>What is the primary purpose of anticoagulation therapy for atrial fibrillation patients?</td>
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<td>What is the CHADS2 score and how is it calculated?</td>
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<td>What is the most significant risk of anticoagulation therapy for atrial fibrillation patients? List additional risks of anticoagulation therapy.</td>
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<tr>
<td>What is the HAS-BLED score and how is it calculated?</td>
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<td>When warfarin is selected, what is the dose/administration, goal INR and adverse effects/risk?</td>
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<td>When dabigatran is selected, what is the dose/administration, monitoring and adverse effect/risk?</td>
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<td>When rivaroxaban is selected, what is the dose/administration, monitoring and adverse effect/risk?</td>
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<td>When apixaban is selected, what is the dose/administration, monitoring and adverse effect/risk?</td>
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13. List the drug therapies needed in different stroke stages; acute, peri-stroke period & 2nd prophylaxis.
### Readings for the Home Study Guide (link below or provided as pdf)

6. Aggrenox (dipyridamole/ASA); Plavix (clopidogrel); Pletal (cilostazol) & Ticlid (ticlopidine) Prescribing Information Access via [www.fda.gov/cder](http://www.fda.gov/cder), or [www.aggrenox.com](http://www.aggrenox.com), or [www.plavix.com](http://www.plavix.com), [www.pletal.com](http://www.pletal.com), [www.activase.com](http://www.activase.com)

### Recommended Readings

Cardiovascular Pharmacotherapy: A Point-of-Care Guide  Chapter 13 Available from [www.ashp.org/bookstore](http://www.ashp.org/bookstore)

### QUESTIONS:

**Describe the difference between an ischemic stroke, transient ischemic attack and intracerebral or subarachnoid hemorrhage.**

**When alteplase is selected for acute ischemic stroke, understand patient selection criteria and intravenous dose and administration.**

**Explain the bleeding risks associated with thrombolytics, including intracranial bleeding/hemorrhagic transformation.**

**List the dose, administration, contraindications/major warnings and common ADRs of the antiplatelet agents:**

- a. Aspirin
- b. Ticlopidine
- c. Clopidogrel
- d. ASA/dipyridamole
- e. Cilostazol
13. Describe the pathophysiology of atherosclerosis and acute coronary syndromes and relate this back to the antithrombin and antiplatelet agents used to manage this disorder.

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ACC/AHA Guidelines and statements pertinent to ACS/CAD also found at: http://my.americanheart.org/professional/StatementsGuidelines/ByTopic/TopicsA-C/ACCAHA-Joint-Guidelines_UCM_321694_Article.jsp


**Recommended Readings**

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Describe the pathophysiology of acute coronary syndromes and the role pharmacologic therapy has on the outcomes of the disease

What is the onset and duration of action of aspirin, clopidogrel, prasugrel, ticagrelor and vorapaxar?
Compare and contrast the safety and efficacy of clopidogrel, prasugrel and ticagrelor.

How do drug interactions, genetic polymorphisms and other factors affect clopidogrel responsiveness?

List the risk factors for bleeding in patients receiving anti-thrombotic therapy for coronary artery disease.

What is the current role of thrombolytics in the management of ST-segment elevation MI?

Identify ACS high risk features and differentiate recommended therapy for low and high risk patients.

Compare and contrast the safety and efficacy of heparin, LMWH, bivalirudin, fondaparinux and IIb/IIIa inhibitors in the management of ACS.

14. Identify the onset of heparin induced thrombocytopenia and develop treatment strategies.

Readings for the Home Study Guide (link below or provided as pdf)
2. Treatment and Prevention of Heparin Induced Thrombocytopenia CHEST. 2012;141(2_suppl):e495S-e530S

Recommended Readings

QUESTIONS:
Describe the pathophysiology of heparin induced thrombocytopenia.

What is the role of the Elisa PF4 and serotonin release assays? What are the limitations of each?
Discuss the time of onset, expected impact on platelets, risk of thrombosis. Understand how to use this data in Warkentin’s 4T prediction model.

Develop a therapeutic recommendation for a patient with isolated HIT and one for a patient HIT with thrombosis. List pros and cons of available treatment options, doses and monitoring.

15. Interpret strategies used to manage hemorrhagic complications associated with anticoagulant and antiplatelet agents

Readings for the Home Study Guide (link below or provided as pdf)
1. Anticoagulation Therapy: A Point-of-Care Guide Chapter 7
2. Evidence Based Medicine of Anticoagulant Therapy. CHEST. 2012;141(2_suppl):e152S-e184S


Recommended Readings

QUESTIONS:
List the risk factors for increased anticoagulant bleeding. (Table 7-1; Anticoagulation Therapy: A Point-of-Care Guide)
   a. Anticoagulation-
<table>
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<th>List 4 different approaches to reversing anticoagulation effects. (Table 7-2; Anticoagulation Therapy: A Point-of-Care Guide)</th>
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<th>What are the main characteristics of urgent, semi-urgent, non-urgent reversal and “rebound risk” for each? (Table 7-3, 7-4, 7-5, 7-6, figure 7-1; Anticoagulation Therapy: A Point-of-Care Guide)</th>
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<td>a. Urgent-</td>
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<td>c. Nonurgent-</td>
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<th>List the factors impacting extent and speed of reversal. (Table 7-8; Anticoagulation Therapy: A Point-of-Care Guide)</th>
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<tr>
<td>a. Thrombosis risk-</td>
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<td>b. Bridge therapy requirements-</td>
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<td>c. Patient risk factors-</td>
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<td>d. Intensity of current anticoagulation-</td>
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<td>e. Dose of anticoagulant-</td>
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<td>f. Ability of patient to eliminate anticoagulant-</td>
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<td>g. Predictability of reversal agent effects</td>
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Using the FDA approved prescribing information for each of the following agents, list the following information points:
Agents: Aqua Mephyton IV, Protamine, Novoseven RT, FEIBA, Profilnine, Kcentra

Points: Active ingredient, recommended dose, route, frequency, onset of action, FDA approved indication, contraindications, black box warning and major adverse reactions.

Briefly list some of the considerations for reversal of each of the following agents-

a. Unfractionated heparin

b. Low Molecular Weight heparin

c. AntiXa agents-

d. DTI’s

e. Warfarin

List usual protamine dose(s) for reversal of heparin and low-molecular-weight heparin associated bleeding. (Table 7-11; Anticoagulation Therapy: A Point-of-Care Guide)

16. Be able to determine peri-procedural anticoagulant regimen for patients based upon indication for anticoagulation and risk factors

Readings for the Home Study Guide (provided as pdf)
1. Chest supplement, 9th edition, 3265-3505 Appendix Table 3.1 and 3.2

Recommended Readings

QUESTIONS:
1. List those procedures that are of low risk and may not require interruption of anticoagulation.

2. List the questions that must be answered prior to determining periprocedural anticoagulation regimen.
3. List those procedures that place patients at high risk of bleed.

4. Describe the risk categories (i.e. high, moderate, low) of thromboembolism based on patient’s past medical history of a mechanical heart valve, or atrial fibrillation, or venous thromboembolism.

5. Describe the optimal level of anticoagulation based upon risk categories described in #4.

**Patient Case**

69 year old patient is planning to have knee replacement surgery

Medications: Warfarin 3mg, metoprolol 12.5mg BID, Lisinopril 10mg daily
PMH: paroxysmal atrial fibrillation, congestive heart failure, chronic kidney disease
Labs: Calcium 8.7 mg/dL, Sodium 136 mmol/L, Potassium 4.3 mmol/L, WBC 13.3 K/ul, Hg9 G/dL, Platelets 397 K/UL, Creatinine 1.8 mg/dL, INR-2.1

1. What is this patient’s TE risk category?

2. What is this patient’s risk of bleed and procedural risk?

3. Should warfarin be discontinued prior to procedure and if so, at what time should that occur?
Instructions. The home study portion must be completed in order to participate in the live program. A passing score of 70% must be achieved on the self-study online exam. Those failing to achieve this score will be contacted prior to the program for discussion and remediation. There should be 11 pages including the answer sheet.

1. The test must be completed by no later than October 31, 2014.
2. Answers must be faxed to NYSCHP at 518-456-9319 or email to jbleyl@nyschp.org.

Atrial Fibrillation

1. Choose the correct statement(s).

   a. Low to intermediate risk atrial fibrillation patients taking warfarin should reach a target INR of 2 to 3 and high risk atrial fibrillation patients (CHADS2 ≥3) taking warfarin should reach a target INR of 2.5 to 3.5.
   b. The optimal intensity of warfarin for stroke prevention in atrial fibrillation patients is an INR 2 to 3.
   c. High risk atrial fibrillation patients would have a reduced stroke risk with a combination of clopidogrel and warfarin with an INR targeted to 1.5 to 2.5.
   d. a and c are both correct
   e. b and c are both correct

2. Choose the correct statement(s).

   a. In patients taking dronaderone, the dabigatran dose is 75mg bid.
   b. Never use the p-glycoprotein inhibitors dronaderone, amiodarone or verapamil with dabigatran due to a high risk of bleeding.
   c. In patients taking p-glycoprotein inhibitors, dabigatran 75mg bid or 110mg bid may prescribed.
   d. a  and c
   e. None of the above are correct.

3. Choose the correct statement(s) for transitioning from warfarin to rivaroxaban in an atrial fibrillation patient.

   a. Rivaroxaban 15mg should begin and warfarin discontinued when the warfarin patient’s INR is ≤2 regardless of calculated creatinine clearance or presence of amiodarone.
   b. Rivaroxaban 15mg should begin and warfarin discontinued when the warfarin patient’s INR is ≤3 and the calculated creatinine clearance is 15 to 50ml/min.
   c. Rivaroxaban 20mg should begin and warfarin discontinued when the warfarin patient’s INR is ≤3 and the calculated creatinine clearance is > 50ml/min.
   d. b and c
4. Which of the following patient(s) are at increased risk for stroke?

a. History of permanent atrial fibrillation x 5 years; rate controlled on metoprolol XL 100mg qday.
b. History of persistent atrial fibrillation x 1 year, rhythm controlled on dofetilide 250mcg q12h.
c. Paroxysmal atrial fibrillation x 4 days; on amiodarone following cardiac bypass surgery.
d. a and b

e. a, b and c

The next 2 questions are based on the following case:

A.M. is a 74yo male who presents to the ED with symptoms of being “dizzy, lightheaded & my heart is racing”. He states the symptoms did not bother him much the first 2 days, but since it has gone on for 4 days, his wife suggested he seek medical care. He is a good historian and prior medical records confirm his history.

Medical History: Hypertension, Type 2 diabetes, BPH, GERD
Surgical History: Appendix removed 10 years ago; Knee replacement 7 weeks ago
Home medications: Pantoprazole 40mg qday; Avalide 300-12.5mg qday; Glyburide 5mg bid; Metformin ER 1000mg qday; Flomax 0.4mg qday

He is hemodynamically stable and he is diagnosed with atrial fibrillation.

Labs: HgA1c 6.2%; basic metabolic panel (Serum creatinine 1.4), LFT, CBC all within normal limits.
Height: 5’ 8” Weight: 71kg

5. Calculate A.M.’s CHADS2 score

a. 0
b. 1
c. 2
d. 3
e. Unable to calculate with current information.

6. Choose the correct oral anticoagulation strategy for A.M.

a. Warfarin targeted to an INR of 1.5 to 2.5 due to recent knee replacement surgery.
b. Rivaroxaban 15mg qday
c. Rivaroxaban 10mg qday
d. Dabigatran 150mg bid
e. Anticoagulation is not needed because he is hemodynamically stable and has been symptomatic for less than 1 week.
Stroke

7. Choose the **correct** statement for a 65yo Female weighing 78kg:

   a. Acute ischemic stroke (noncardioembolic), presentation 1 hour after 1st symptoms, no drug therapy contraindications treated with alteplase IV 100mg IV over 2 hours to complete infusion within the 3 hour time limit.
   b. Acute ischemic stroke (noncardioembolic), presentation 3.5 hours after 1st symptoms, no drug therapy contraindications treated with alteplase IV 7mg IV bolus, followed by 63mg IV over 60 minutes
   c. Acute ischemic stroke (noncardioembolic), presentation 6 hours after 1st symptoms, no drug therapy contraindications treated with heparin 5,000 unit IV bolus, followed by 1,000 units per hour.
   d. a and b
   e. a, b and c

8. B.W. is a 87kg 63yo M patient diagnosed 48 hours ago with acute ischemic stroke (noncardioembolic). The patient did not receive alteplase because he presented too late for treatment. Lab results & vital signs are within normal limits. Calculated creatinine clearance is > 50ml/min. Select a long-term drug regimen to prevent stroke recurrence.

   a. Clopidogrel 75mg PO qday
   b. Aspirin 81mg PO qday
   c. Aggrenox 1 capsule PO BID
   d. All of the above are appropriate.

9. Choose the **correct** statement(s).

   a. Secondary stroke prevention in a patient with ischemic stroke (noncardioembolic) may be achieved with aspirin or Aggrenox or clopidogrel or warfarin (INR target 2 to 3).
   b. Secondary stroke prevention in a patient with ischemic stroke (atrial fibrillation) may be achieved with warfarin (INR target 2 to 3) or Aggrenox.
   c. Secondary stroke prevention in a patient with TIA (noncardioembolic) may be achieved with aspirin or Aggrenox or clopidogrel.
   d. a and c are both correct
   e. a, b, and c are all correct.
10. C.M. is a 78yo F weighing 63kg. Her past medical history includes: Diabetes, hypertension, MI (5 years ago), chronic heart failure (class II), penicillin allergy (hives), aspirin allergy (hives). She presented within 3 hours of her stroke symptoms, was carefully evaluated, “ruled in” and received alteplase IV for her diagnosis of acute ischemic stroke (noncardioembolic). Unfortunately this was complicated by intracranial hemorrhage that occurred 14 hours after the alteplase infusion. It has been 2 weeks and the neurologist agrees to allow her to begin secondary stroke prevention. Select a long-term drug regimen to prevent stroke recurrence.

   a. Clopidogrel 75mg PO qday  
   b. Aggrenox 1 capsule PO BID  
   c. Cilostazol 100mg PO qday  
   d. All of the above are appropriate.

**Thrombosis and Hemostasis/ Anticoagulant PK/PD and clinical application**

11. Endogenous inhibition of the coagulation cascade involves which of the following elements (self-control of the coagulation cascade):

   i. Protein S  
   ii. D-dimer  
   iii. Antithrombin III  
   iv. Tissue factor  
   v. Tissue factor platelet inhibitor

   a. i, iii, iv  
   b. i, iii, v  
   c. i, ii, iii, v  
   d. All the above

12. The initial rise in INR during the first few days of warfarin therapy reflects the drop in what clotting factor?

   a. Thrombin (Factor II)  
   b. Factor VII  
   c. Factor VIII  
   d. Protein C

13. Which of the following statements regarding warfarin therapy in the initial treatment of VTE is **NOT** true?

   a. Warfarin therapy should begin within 1-2 days of starting therapy with UFH or LMWH.  
   b. Therapy with UFH or LMWH can be discontinued after an overlap of at least 5 days and when the international normalized ration is greater than or equal to 2 for 2 values (ie within 24 hours).  
   c. Systematic follow-up (i.e., anticoagulation clinics) of warfarin therapy should be initiated.  
   d. Warfarin therapy should be postponed until the patient is stable
14. Which one of the following is the LEAST thrombogenic risk factor?
   a. Previous VTE  
   b. Trauma  
   c. Pregnancy  
   d. Young age (< 20 yrs old)  

15. When managing warfarin therapy in an outpatients, choose the **INCORRECT** statement regarding dose adjustments of warfarin.
   a. Dose increase/decrease adjustments range between 5-20% of weekly dose with a recheck of INR in approx. one week  
   b. Changes in dose should ideally be spread out over the course of the week  
   c. In a patient whose INR is typically very stable, a one-time deviation in INR of +/- 0.5, indicates a need for a weekly dose adjustment of 10%-20%.  
   d. It is best for patients to have only 1 tablet strength rather than multiple strengths when dose adjusting.  

**Use the below case to answer questions 16 through 19:**

UT is a 69 yo male patient who presents to the emergency room with lower leg pain. He states his right calf started to bother him about 1 week ago, it felt like a “charlie-horse”. At first he thought it was due to his exercising. However, now there is some swelling, redness and tenderness while walking. He denies any shortness of breath or chest pain.

FH: married lives at home with his wife  
   Retired engineer

SH: smoker – quit 3 months ago; moderate ETOH use (1-2 beers 2-3 nights a week)

PE:  
   vitals WNL  
   Ht: 5’ 11” Wt: 220 lbs

PMH: Rt Total knee replacement surgery (TKR) - 3 weeks ago
   • Received 7days of prophylactic enoxaparin post surgery while in hospital  
   Hypercholesterolemia  
   Hypertension

Medications:  
   Hydrochorthiazide 25mg qday  
   Pravachol 40 mg qday  
   ASA 325mg BID – started after discharged from hospital s/p TKR  
   Lisinopril 10 mg qday

ROS: all aspects within normal limits. Surgical site looks clean and dry, no infection. No signs of bleeding. He is ambulating well with home rehabilitation.
Laboratories:

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<th>In ER at time of admission</th>
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He is sent for a CT Scan and ultrasound and found to be positive for a right leg proximal (above the knee DVT) but negative for PE.

16. What is true regarding UT and the possibility for outpatient therapy? UT is……..
   a. not a candidate due to his recent surgery
   b. not a candidate as he could have a pulmonary embolism not identified on CT scan
   c. a potential candidate as he has no exclusion criteria
   d. not a candidate for home therapy as he is also on aspirin therapy

17. The physician wants to initiate enoxaparin for UT. Which of the following dosing regimens would you recommend to the physician for UT?
   a. Enoxaparin 1mg/kg SQ q12h
   b. Enoxaparin 60 unit/kg IV bolus plus 15 units/kg/hr continuous infusion
   c. Enoxaparin 10 mg/kg SQ q12h
   d. Enoxaparin 1mg/kg SQ qday

18. What would be the target INR for UT and his current diagnosis of DVT?
   a. 1.5-2, as he is high risk for bleeding post surgery
   b. 1.8-2.2, as this is the target s/p orthopedic procedures
   c. 2-3, as this is the most effective and safe range
d. 2.5-3.5, as he had failed prophylactic strategies so he needs a higher target INR

Two days after starting enoxaparin, a follow-up CBC reveals the following:

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19. What hypothesis can be made regarding these values?
   
   a. UT could possibly have heparin induced thrombocytopenia (HIT) and needs further assessment to rule out
   b. UT could not have HIT as he has not been on enoxaparin for the 5-14 days for which HIT is likely to develop
   c. UT platelet count of 200 does not categorize him as thrombocytopenic so he likely does not have HIT
   d. UT is likely developing another thrombosis as evident by the consumption of platelets and corresponding drop in platelet count
   e. LMWH are not likely to cause HIT, so his drop in platelet count must be from something else and requires further work-up.

20. Which of the following statement(s) is/are TRUE regarding HIT?
   
i. Incidence of thrombosis is rare with HIT
   ii. Patients that develop HIT without thrombosis do not require any further treatment other than stopping the offending heparin/heparin-like agent
iii. Patients who develop a thrombosis associated with heparin/heparin-like product should be immediately initiated on warfarin therapy
iv. The HIT antibody typically goes away after 3 months

a. i, iv
b. ii, iii
c. iii, iv
d. ii, iv
e. iv only

**Bleeding and Periprocedural Anticoagulation Management**

21. The questions that should be answered prior to determination of periprocedural anticoagulation include:

   a. Is interruption of antithrombotic therapy in the perioperative period needed.
   b. If antithrombotic therapy needs to be interrupted, is bridging anticoagulation needed.
   c. How often should INR measurements take place with restart of warfarin?
   d. A and B

22. Due to concerns of anaphylaxis, phytonadione should be given as oral form for patients with severe hemorrhagic event (e.g. intracerebral hemorrhage).

   a. True
   b. False

23. Unfortunately, a 75 kilogram patient that is on heparin infusion at 1000 units per hour is now exhibiting signs of a serious bleeding event. The heparin has been stopped and you recommend a protamine dose of:

   a. 12.5
   b. 15
   c. 17.5
   d. 20

24. The following are true statements regarding Fresh Frozen Plasma (FFP) except:

   a. Time delay in administration can be significant
   b. Concern for blood borne pathogen (e.g. HIV) limits use of FFP
   c. FFP should decrease INR for about 6 hours

25. In patients that have had major surgery and/or are at high risk for bleeding, the following options are acceptable except:

   a. Delaying initiation of anticoagulation for 2 to 3 days after surgery
   b. Administering LMWH administration close to time of surgery
   c. Avoiding all anticoagulation
d. All of the above are acceptable options

26. The risk factors for increased anticoagulant bleeding include all of the following except:

   a. Age >70 years
   b. history of gastrointestinal bleeding
   c. higher INR
   d. Hypothyroidism
   e. Malignancy

27. The elderly patient is at an increased risk of bleeding and therefore the risks of anticoagulation therapy generally outweigh the benefits.

   a. True
   b. False

28. In a patient that has evidence of bleeding but needs to be continued on Warfarin therapy, the strategy of targeting INR at lower end of range (i.e. 2) is acceptable.

   a. True
   b. False

29. A patient with INR greater than 5 should be treated with phytonadione.

   a. True
   b. False

30. A patient with atrial fibrillation and no other risk factors should be hospitalized and bridged with intravenous unfractionated heparin prior to total hip replacement.

   a. True
   b. False

31. Maximum platelet lifespan is:

   a. Month
   b. 7 days
   c. 10 days
   d. 21 days

32. Aspirin irreversibly acetylates a serine residue of the cyclooxygenase (COX-1) enzyme.

   a. True
   b. False

33. Platelet inhibitory effects are seen within 1 hour of enteric coated aspirin administration
34. Potential reasons for variable response to clopidogrel’s antiplatelet effects include all of the following except:
   a. CYP 2C19 status
   b. Adherence
   c. Smoking
   d. HMG CoA Reductase inhibitor drug interaction

35. The preferred anti-thrombin agent for STEMI patients with intact renal function who have undergone reperfusion therapy is:
   a. Unfractionated Heparin
   b. Enoxaparin
   c. Fondaparinux
   d. Dalteparin

36. Prior to STEMI patients undergoing PCI, fibrinolytic therapy should be administered
   a. True
   b. False

37. Non-ST segment elevation MI (NSTEMI) patients undergoing PCI should receive the following:
   a. Aspirin and Clopidogrel 300mg
   b. Aspirin, Clopidogrel 600mg and GPIIbIIIa inhibitor
   c. Aspirin and GP IIbIIIa inhibitor
   d. Clopidogrel 600mg alone

38. For NSTEMI patients undergoing an early conservative strategy fondaparinux is preferred over enoxaparin
   a. True
   b. False

39. The conversion of prasugrel to its active form is more efficient than the conversion of clopidogrel to its active form.
   a. True
   b. False

40. Which of the following is an adverse effect unique to ticagrelor?
   a. Intracranial hemorrhage
   b. Dyspnea
   c. Hepatotoxicity
   d. Thrombotic thrombocytopenia purpura
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