National Certification
Board for Anticoagulation
Care Providers

2010
Candidate Handbook
for
Certified Anticoagulation
Care Provider (CACP)

Certified Anticoagulation Care Provider Candidate Handbook

This handbook is valid for exams administered in 2010 and is subject to change at anytime. Any changes will be made available via the NCBAP website at www.ncbap.org.

NCBAP Mission Statement

The mission of the National Certification Board for Anticoagulation Providers (NCBAP) is to improve the quality of patient care through recognition and promotion of specialized knowledge and skills pertaining to antithrombotic therapy.

Objectives of Certification

The National Certification Board for Anticoagulation Providers (NCBAP) endorses voluntary certification of anticoagulation providers who meet education and patient-care requirements. The purpose of the certification process is to meet a societal need to protect public health and well being by:

1. Providing an accepted assessment of current knowledge, skills and competencies necessary for individuals providing direct anticoagulation education and therapeutic management.
2. Promoting individual professional growth and development in the practice of anticoagulation therapy.
3. Nationally recognizing and validating anticoagulation providers who fulfill certification requirements.

This certification process is designed and intended for practitioners whose primary role as an anticoagulation provider includes systematic, organized, and on-going patient education and therapeutic management in the inpatient and/or outpatient setting.

Definition of Anticoagulation Provider Responsibilities

A Certified Anticoagulation Care Provider (CACP) is a health care professional who:

- provides documentation of 750 hours of active anticoagulation patient management in the preceding 18 months prior to the application deadline
- demonstrates achievement of advanced knowledge and skills by passing a comprehensive examination
- has experience consistent with the applicant's scope of practice for the state in which he/she practices

This set of knowledge and skills are routinely drawn upon in the course of education and managing patients receiving antithrombotic therapies. Specific competencies demonstrated by a Certified Anticoagulation Care Provider include:

1. A working knowledge of the normal physiological processes of hemostasis and thrombosis, and the etiology, risk factors and clinical manifestations of pathologic thrombus formation
2. Knowledge of the pharmacological properties of antithrombotic drugs
3. Knowledge, skills and ability necessary to manage and monitor patients receiving antithrombotic therapies. This includes assessment of efficacy and potential toxicity, achievement of therapeutic goals, and evaluation of patient-related variables that affect therapy management.
4. Ability to provide patient education regarding antithrombotic therapy, including: individualized patient assessment, formulation of an educational plan with specific goals and objectives, implementation of an educational plan, and assessment and evaluation of patient knowledge and skills pertaining to anticoagulation therapy

Eligibility Requirements

To be eligible to take the certification examination, applicants must meet and provide documentation of professional qualification and professional experience as outlined below.

Professional Qualification: To be eligible, the candidate must hold his/her professional license for a minimum of 2 years prior to the application deadline and must provide a copy of a current United States (or territories) license, registration, or certification as a:

Registered Nurse (RN), Advance Practice Nurse (NP), registered or licensed pharmacist (BS pharmacy or Pharm.D.), licensed physician (MD), or physician assistant (PA)

The list above is exhaustive. An applicant MUST hold at least one of the professional licenses listed above to be eligible to sit for the CACP exam.

Professional Experience: The applicant must provide documentation of a minimum of 750 hours of active anticoagulation patient management in the 18 months immediately preceding the application deadline. Such documentation will be provided as follows:

1. When completing the online application, the applicant must attest to having provided a minimum of 750 hours of active anticoagulation patient management. This experience must have been accrued within the 18 months immediately preceding the application deadline.

2. The applicant must provide a written description of current activities pertaining to anticoagulation therapy management. The written description should be 500 words or fewer and should describe the applicant's general practice and experience specifically in antithrombotic therapy management. Duration and

types of activities should be described, including number of patients, practice setting, management of clinic, the applicant's roles and responsibilities, and co-workers, etc. Paragraph format should be used; a resume or curriculum vitae will not suffice.

3. The applicant must provide a work email address (i.e. no hotmail, gmail, etc.) for his/her direct supervisor so that information provided by the applicant can be verified.

Some examples of experiences, which will NOT be counted toward the professional experience requirement include:

- Providing continuing education credit awarded to professionals, or receipt of professional continuing education credit
- General medical, nursing, or pharmacy practice
- Conducting/participating in research activities in which the candidate is NOT involved in direct anticoagulation education and patient management
- Dispensing/prescribing antithrombotic medications or related equipment
- Supervising and managing other professionals
- Membership and committee work in professional organizations
- Any work or experience prior to receipt of license, registration or advanced degree
- Hours of anticoagulation care provided during postgraduate training programs (example: pharmacy or medical residents) cannot be counted towards the 750 hours

Rejected Applications

Applications may be rejected under the following circumstances:

- An applicant does not meet eligibility requirements
- The application is incomplete or improperly completed
- The application and/or fee are not submitted by the published deadlines

Certification Status and Use of Certification Mark

Only the National Certification Board confers the Certified Anticoagulation Care Provider (CACP) credential for Anticoagulation Providers.

Certification is a process granting recognition to an individual who has satisfactorily met all eligibility requirements and has passed the examination. After notification of passing the CACP Examination, an individual may use the mark "CACP" following his/her name as long as he/she maintains a current CACP credential.

Recertification

The National Certification Board for Anticoagulation Providers requires all CACPs to recertify by examination every five (5) years. At least 10 weeks prior to his/her credential expiration date **and** the desired exam date, an applicant for recertification should submit a new application packet according to the current application procedures as

described on the NCBAP website. The applicant should note available recertification dates and ensure that he/she applies in time to sit for an examination scheduled on or before the date on which his/her credential expires. Further details pertaining to recertification can be accessed online at www.ncbap.org.

Applicants for recertification are required to meet the same professional qualification and experience eligibility requirements imposed on first-time applicants. See the section entitled "Eligibility Requirements" for additional details.

Fees

A fee of $400.00 is due with the application packet. All payments are collected online. See website for further details.

Notice of withdrawal from a scheduled examination must be submitted in writing to the NCBAP. Applicants will receive a refund of the application fee minus a $100.00 administrative fee. This fee is non-refundable and covers the cost of application handling and review process. Individuals whose applications are NOT approved will receive a refund of the application fee minus a $100.00 administrative fee. Application packets will not be returned to the applicant.

Failure to appear for a scheduled exam without making prior arrangements will result in a $100.00 rescheduling fee.

Approved testing sites may charge the applicant a fee for administering the exam. Fees charged by exam sites are typically less than $25. Any such fees should be paid directly to the exam site and are in addition to the application/exam fee charged by the NCBAP.

Examination Content and Format

The CACP examination contains 160 multiple-choice questions. Of these 160 questions, 150 are scored items, and 10 pilot test questions are included for validation for use on future exams. These 10 pilot questions are randomly distributed, not identified to the examinee, and are not used in scoring the exam.

Two hours and thirty minutes (2 hours, 30 minutes) are provided for completing the exam. No answers can be recorded after time has expired. If an applicant attempts to answer questions once time has expired, his/her exam will be automatically disqualified and no score will be reported to the applicant.

When taking the online exam, instructions will be displayed onscreen before time begins. Time will begin only when the applicant indicates that he/she is ready to view the first exam question. A timer is available for display onscreen during the exam. When a case scenario is presented onscreen, all questions pertaining to that case will appear onscreen with the scenario. Otherwise, 3 questions are presented onscreen at one time to minimize the need for scrolling during the examination. The online exam program will allow the applicant to return to previously viewed questions, and the applicant may change a response to any question up until he/she indicates that his/her exam is complete or until

time expires, whichever comes first. Once approved to sit for the exam, applicants are provided a link to view a sample of the online exam environment to become familiar with the layout prior to taking the exam.

The Certified Anticoagulation Care Provider examination content is derived according to the domain breakdown below:

Domain I	Applied Pathophysiology of Thromboembolic Disease	20%
Domain II	Patient Assessment and Management	30%
Domain III	Patient Education	20%
Domain IV	Applied Pharmacology of Antithrombotic Agents	20%
Domain V	Operational (Administrative) Procedures	10%

The following is an example of a typical question format and style:

You are asked to see a post-operative total hip replacement patient for warfarin DVT/PE prophylaxis. The orthopedic surgeon would like prophylaxis maintained for 6 weeks following discharge. What range of INRs is recommended for this patient?

a. 1.5 – 2.0
b. 1.8 – 2.0
c. 2.0 – 3.0
d. 2.0 – 3.5

Examination Scoring Process

As described previously, 150 of the 160 items on the CACP exam are used for scoring. An applicant must correctly answer 80% of the scored items in order pass the exam.

Score Reporting

Applicants receive notification of exam score by email within 4 weeks of examination date. If the applicant passed the examination, an official CACP certificate and lapel pin will be mailed to the address on file within 8 weeks of the examination date.

If you do Not Pass the Examination

If an applicant fails to achieve a passing score on the CACP exam, he/she may reapply by submitting a new application packet and exam fee using the then-current application procedure.

The applicant has 30 days after the date on the email notification to formally appeal exam results. Appeals must be made in writing by email to info@ncbap.org. Appeals made more than 30 days after the notification email date will not be considered.

Requests for Special Accommodations

The NCBAP complies with the Americans with Disabilities Act and provides reasonable and appropriate accommodations for those with documented disabilities and for those with a qualifying medical condition that may be temporary.

Requests for special accommodations should be made at the time the application is submitted. At least two exam dates per year will be scheduled at which the NCBAP will provide for special accommodations.

Examination Misconduct

All CACP applicants and examinees are expected to protect the integrity of the CACP credential. Any act that compromises the integrity of the CACP credential, whether done with intent or negligently, is viewed as exam misconduct. Such actions include but are not limited to:

- Bringing unauthorized materials into the exam environment
- Attempting to remove materials from the exam environment
- Communicating exam questions (either verbatim or paraphrased) to others by any means (verbal, written, electronic, etc.) before, during, or after the examination
- Attempting to obtain knowledge of exam questions
- Having knowledge of exam questions prior to taking the exam
- Misrepresenting one's identity
- Making or attempting to make unauthorized communications during the examination
- Using or attempting to use unauthorized reference materials during the examination
- Using or attempting to use any type of recording device during the examination
- Removing or attempting to remove exam content from the test center

All questions appearing on the CACP examination are the intellectual property of the NCBAP and are protected by US laws pertaining to intellectual property rights. The NCBAP does not publish current or past CACP exam questions. Any attempt to receive or distribute CACP exam questions is viewed as an infringement on the intellectual property rights of the NCBAP and is an act of exam misconduct.

In the event of exam misconduct, the applicant's exam will be automatically disqualified and no score will be reported to the applicant.

Exam Dates & Locations

The CACP exam is available online but must be taken at an approved exam site on a scheduled exam date. Available exam dates and approved exam sites are posted on the NCBAP website. Note that most exam sites charge a fee (usually $10-$25) for administering and proctoring the exam. This fee is in addition to the CACP exam fee and should be paid by the applicant directly to the exam site. Applicants should check with the exam site for any special admission requirements.

Individuals who fail to arrive at a designated testing center on scheduled dates and times may be subjected to additional fees for rescheduling by the testing center. Additionally, the NCBAP imposes a $100 rescheduling fee if the applicant does not show up for a scheduled exam. Exceptions may be granted in the event of inclement weather or unforeseen emergencies on the day of an examination. Requests for an exception to the

NCBAP rescheduling fee should be made in writing via email to info@ncbap.org. Note that the NCBAP does not charge a rescheduling fee if the applicant reschedules prior to his/her scheduled exam.

Preparation for the Examination

The exam content is based primarily on national recommendations and guidelines from nationally-recognized authorities in antithrombotic therapy. Refer to the "Examination Content and Format" section of this handbook for a complete breakdown of domains covered on the CACP exam and see Appendix for additional details and references.

The NCBAP does not endorse, financially benefit from, nor participate in the development of any preparatory or review courses or other published materials purporting to be study guides for the CACP Examination.

Statement of Nondescrimination Policy

The NCBAP does not discriminate among applicants on the basis of age, gender, race, religion, national origin, disability, or marital status. Applications submitted for certification are individually reviewed on the basis of information submitted.

CACP Application Submission Instructions

Please follow the application instructions as outlined below. Incomplete applications or those not submitted in accordance with the instructions below will not be considered.

1. Go to www.ncbap.org for a list of available exam dates and submission deadlines.

2. Select an exam site from the list of approved CACP exam sites posted on the NCBAP website (www.ncbap.org). It is the sole responsibility of the applicant to make sure that the exam site can accommodate him/her on the chosen exam date. **Only when the exam date and location are confirmed by the applicant, proceed to STEP 3.**

3. Complete the electronic application prior to the posted submission deadline for the requested exam date. This portion of the electronic application collects demographic/registration information and a description of current anticoagulation activities (500 words or fewer).

4. Remit payment online for the $400.00 exam fee using any major credit card or your checking account. Once the electronic portion of the application AND payment have been verified, an application ID will be issued to you electronically via email. **Proceed to Step 5 only when you have received your application ID.**

5. Once you have received your application ID, the following items should be submitted by fax to 866-963-2588 or by email to info@ncbap.org. Your application ID number should appear on all additional materials.

a. A photocopy of current US professional license

b. A photocopy of current government-issued photo ID

c. Signature statement provided in this packet

6. The applicant will receive email confirmation once all materials have been received.

7. Application decisions will be communicated by email on or before the notification date posted on the NCBAP website. It is the applicant's responsibility to provide a current, valid email address. If notification is not received by the posted date, it is the responsibility of the applicant to check with the NCBAP by email (info@ncbap.org) or by phone (866-963-2588).

8. Any changes to a submitted application must be made in writing by email to info@ncbap.org.

Retain a photocopy of your entire application packet for your records. Application packets will not be returned to applicants.

Application Checklist

Did you:

- € Confirm that your desired exam site can accommodate you on your preferred exam date?
- € Complete the online application?
- € Remit payment for the exam fee?
- € Receive an application ID?
- € Fax or email
  - o A photocopy of current US professional license?
  - o A photocopy of current government-issued photo ID?
  - o Signature statement provided in this packet?
- € Include your application ID on all materials submitted by fax/email?

Appendix

The domain distribution of the exam is as follows:

Domain I	20%
Domain II	30%
Domain III	20%
Domain IV	20%
Domain V	10%

Domain I

Applied Physiology and Pathophysiology of Thromboembolic Disorders

Goal: The Certified Anticoagulation Care Provider must have a working knowledge regarding the normal physiological processes of hemostasis and thrombosis. In addition, the Certified Anticoagulation Care Provider must be knowledgeable regarding the etiology, risk factors, and clinical manifestations of pathologic thrombus formation. To meet this goal, the Certified Anticoagulation Care Provider should be able to:

1. Describe the general process of hemostasis and thrombosis, including the role of the vascular endothelium, platelets, circulating clotting factors, endogenous anticoagulants, and thrombolytic proteins.
2. Describe the clotting cascade including the major functions of thrombin and fibrin. Identify the intrinsic (contact) pathway, extrinsic pathway, and the common pathway.
3. Explain how vitamin-K dependent coagulation proteins (including proteins C and S) are produced, including the role of vitamin K in their production and their relative physiological half-lives. Understand how the comparative half-lives of these proteins influence their depletion by antithrombotic agents and how their time to depletion influences the selection and duration of anticoagulation therapy in the prevention and treatment of thromboembolism.
4. Describe the role of platelet adhesion, activation, and aggregation in arterial clot formation.
5. Recognize platelet disorders and platelet dysfunctional states that can promote bleeding and/or thrombosis (HIT, ITP, TTP).
6. Compare and contrast the formation of a thrombus under conditions of high flow (arterial) and static flow (venous and cardiac chambers) and state the relative contribution of the vascular subendothelium, platelets, and clotting factors in each.
7. Recognize the risk factors for venous thromboembolism
8. Describe the significance of failure to complete venous thromboembolic risk assessment and be able to assess the risks and know appropriate interventions for prophylaxis for venous thromboembolism.
9. Recognize the most frequent signs and symptoms of deep vein thrombosis and pulmonary embolism. Recognize the most frequent signs and symptoms peripheral vascular disease, including thrombotic or embolic causes of acute limb ischemia.

10. Describe the objective diagnostic and laboratory tests that may be employed to diagnose deep vein thrombosis and pulmonary embolism, and recognize factors that influence their interpretation.
11. List the most frequent signs and symptoms of the post-thrombotic (post-phlebitic) syndrome, state how the syndrome may be distinguished from acute deep vein thrombosis, and recognize therapeutic modalities to minimize and/or prevent this syndrome from occurring.
12. List the risks factors for and the most frequent signs and symptoms of atrial fibrillation and atrial flutter. Recognize risk factors for stroke in patients with atrial fibrillation/atrial flutter and identify patients at low, moderate and high risk
13. List the risk factors for and major distinguishing characteristics of ischemic stroke, transient ischemic attacks (TIAs), and hemorrhagic stroke, and the diagnostic tests used to differentiate them.
14. Identify the types of cardiac replacement valves commonly in use and rank the relative risk of thrombosis associated with each based on type and position.
15. List the most frequent signs and symptoms of heart failure, and recognize the effect of exacerbations of heart failure on anticoagulant therapy.
16. Identify the risks factors for and list the most frequent signs, symptoms and clinical presentation of coronary artery disease and cardiac ischemia/infarction.
17. Explain the pathophysiology, relative risk and clinical presentation of thrombosis associated with inherited and acquired hypercoagulable conditions (protein C deficiency, protein S deficiency, antithromin deficiency, factor V Leiden, activated protein C resistance, prothrombin gene mutation, elevated factor VIII, hyperhomocysteinemia, antiphospholipid antibody syndrome, and occult malignancy)
18. Interpret the results of hypercoagulability screening tests, identify factors that can influence their results, describe the difference between heterozygous and homozygous genetic mutations, and explain the clinical and therapeutic implications of hypercoagulability testing results.

Domain II
Patient Assessment and Management

Goal: The Certified Anticoagulation Care Provider must possess the knowledge, skills, and competencies to manage and monitor patients on anticoagulant therapy. This includes the ability to assess the efficacy and toxicity of the prescribed antithrombotic treatment, determine if the therapeutic goals have been achieved, and identify patient-related variables that affect therapy. The Certified Anticoagulation Care Provider should be able to:

1. List the appropriate indications for the use of antithrombotic agents including FDA approved indications as well as the grade A, B, and C recommendations published in ACCP Consensus Conference on Antithrombotic Therapy.

2. List the components of a problem-oriented anticoagulant therapy database. The database should include relevant subjective and objective findings necessary to appropriately monitor patients on antithrombotic therapy.
3. List the medical problems or clinical conditions that would preclude the use of antithrombotic agents or require alteration in dosing (e.g., peptic ulcer, intracranial hemorrhage, congestive heart failure, renal function, and hepatic function).
4. Identify potential barriers to successful use of anticoagulation medications and management (financial hardship, transportation, literacy, health literacy, communication, language barrier).
5. Given a specific patient history including co-morbid diseases, perform a benefit and risk analysis regarding the use of antithrombotic agents, glycoprotein IIb/IIIa inhibitors, and thrombolytic agents (warfarin, heparin, low molecular weight heparin, fondaparinux, direct thrombin inhibitors, and antiplatelet medications).
6. Identify the safe use and potential adverse side effects to a fetus or infant with maternal use of antithrombotic agents during pregnancy and while breastfeeding.
7. Explain/describe the appropriate use of antithrombotic agents when used in children, the elderly, patients with warfarin resistance or seizures, or patients with renal impairment, hepatic failure or heparin induced thrombocytopenia. State the most common adverse effects in these populations.
8. Describe the relationship between the ISI (International Sensitivity Index) of thromboplastins and INR (International Normalized Ratio).
9. Describe/analyze the commonly used laboratory tests for managing antithrombotic therapy including prothrombin time (PT), International Normalized Ratio (INR), activated partial thromboplastin time (aPTT), anti-Xa activity, heparin assay, chromogenic X level, creatinine clearance, hemoccult test, hematocrit, hemoglobin, d dimer, absolute neutrophil count and platelet count. Provide a systematic plan for use and monitoring of the appropriate test in a patient-specific manner.
10. Identify normal/therapeutic/critical values and potential interpretation problems with the use of each of the following laboratory tests: prothrombin time (PT), International Normalized Ratio (INR), activated partial thromboplastin time (aPTT), heparin assay, anti-Xa level, and chromogenic X level.
11. Be able to interpret baseline tests used to assess hepatic function (LFTs) and renal function (BUN, creatinine, GFR/creatinine clearance) and recognize their clinical importance in anticoagulation therapy management.
12. Identify situations when the following tests should be ordered or would be helpful in patient management: d-dimer, anti-platelet antibodies, protein C and S antigens and/or activity, antithrombin III activity, factor V Leiden, activated protein C resistance, prothrombin gene mutation, antiphospholipid antibodies, fasting homocysteine, factor VIII level.
13. Make appropriate decisions when adjusting the dose of antithrombotic therapy to improve anticoagulation control (i.e., tailor dosage adjustments based on patient-related variables).

14. Develop a plan to detect, evaluate, and manage a hemorrhagic event in a patient who experiences bleeding while taking anticoagulant therapy.
15. Determine the appropriate action to detect, evaluate, and manage a non-hemorrhagic adverse event in a patient who is taking anticoagulation therapy (e.g., skin necrosis, venous limb gangrene).
16. List and state the relative effectiveness of commonly used non-pharmacological methods for the prevention and treatment of thromboembolism.
17. Describe and recommend an appropriate plan to initiate anticoagulant therapy including the concomitant use of multiple antithrombotic agents.
18. Develop a plan for systematic, continuous follow up care (i.e., management and coordination) for patients on anticoagulation therapy.
19. Describe and implement appropriate plans for discontinuing antithrombotic therapy taking into account disease-related and patient-related variables (e.g., noncompliance, thromboembolic risk, development of new medical problems).
20. Identify illnesses and lifestyle behaviors that may alter anticoagulation response. Specifically, describe their likely impact (e.g., increased or diminished anticoagulant effect), clinical significance, and appropriate actions to take to avoid them.
21. Develop rational strategies to manage drug-drug, drug-herbal/supplement and drug-food (including nutrient) interactions with antithrombotic therapy.
22. Identify risk factors for anticoagulation-induced bleeding. Appropriately assess a patient at risk for bleeding, and describe appropriate situations when a patient should be referred to a physician/emergency room for further evaluation.
23. Identify risk factors for the development of thromboembolism. Appropriately assess a patient at risk and recognize circumstances when a patient should be referred for further evaluation.
24. Assess the peri-operative/peri-procedural bleeding risks and thromboembolic risks and develop a specific plan to manage a patient's anticoagulant therapy in situations requiring temporary discontinuation of anticoagulation therapy(e.g. dental procedures, surgery, colonoscopy).
25. Compare the potential advantages and disadvantages of point-of-care testing, patient self-testing, and patient self-management for monitoring antithrombotic therapies.
26. Identify patients who would best qualify for patient self testing and how to obtain, train and manage patients with home monitors.
27. Describe the procedures to properly use point-of-care prothrombin time monitors. (eg. Coagucheck, ProTime, Avosure, Hemosense).
28. Recognize and describe conditions that require emergency triage (e.g., acute shortness of breath, severe chest pain, loss of consciousness, trauma, acute neurological symptoms).
29. Interact and communicate effectively with other health care professionals to facilitate the continuum of care of patients on anticoagulation therapy.

30. Develop a plan to detect, evaluate, and manage a thromboembolic event in a patient who experiences symptoms of clotting while taking anticoagulation therapy.

Domain III
Patient and Family Education

Goal: The Certified Anticoagulation Care Provider must provide patient education that is tailored to patients' specific needs to promote safety, enhance adherence, and positively effect clinical outcomes. Anticoagulation providers must be able to perform an educational assessment, develop an educational plan, and document the educational activities in the patient's medical record. Anticoagulation therapy poses risks to patients and often leads to adverse drug events due to complex dosing, requisite follow-up monitoring, and the potential for inconsistent patient compliance. The use standardized and patient specific practices for anticoagulation therapy that include the patient and or family involvement can reduce the risk of adverse events associated with the use of anticoagulant/antithrombotic drugs (e.g. heparin [unfractionated], low molecular weight heparin, and warfarin). The Certified Anticoagulation Care Provider should be able to:

1. Identify and assess a patient's cognitive, functional or physical impairments, health literacy, and readiness to learn.
2. Identify learning and teaching styles.
3. Discuss the basic curriculum content for a patient's education plan, including: drug knowledge, dose administration, factors influencing a stable response to therapy such as potential interactions with therapy, signs and symptoms of adverse affects, importance of periodic blood testing to monitor the therapeutic effect, what to report to the warfarin manager or clinic and other safety issues.
4. Evaluate family / social supports and the potential impact on the educational process.
5. Describe the educational needs of special populations (e.g. children, elderly, mentally impaired, primary language is non-English).
6. Identify appropriate methods to determine a patient's knowledge, skill, and attitudes regarding anticoagulation therapy.
7. Identify appropriate educational materials and determine methods to obtain them.
8. Recognize behaviors that may be an indicator for non-adherence to antithrombotic therapy and develop appropriate educational interventions.
9. Identify community resources to reinforce/augment plan of care.
10. Develop a list of specific learning objectives regarding the use of point-of-care testing devices.
11. Provide education regarding anticoagulant therapy to prescribers, staff, patients, and families—where patient and family education includes the importance of follow-up monitoring, compliance issues, dietary restrictions, and potential for adverse drug reactions and interactions.

Domain IV
Applied Pharmacology of Antithrombotic Agents

Goal: The Certified Anticoagulation Care Provider must possess and maintain an in-depth knowledge regarding the pharmacologic properties of antithrombotic drugs. To meet this goal, the Certified Anticoagulation Care Provider should be able to:

1. List the brand name(s) and generic name of drugs currently approved by the FDA and frequently used in clinical practice for the prevention and/or treatment of thrombosis including warfarin, heparin, low molecular weight heparins (enoxaparin, dalteparin, tinzaparin), fondaparinux, direct thrombin inhibitors (argatroban, bivalirudin, lepirudin), antiplatelet agents (aspirin, clopidogrel, ticlopidine, dipyridamole, ASA/dipyridamole [Aggrenox]), glycoprotein IIb/IIIa inhitors (abciximab, eptifibitide, tirofiban), and thrombolytic agents (alteplase, anistreplase, reteplase, streptokinase, tenecteplase,urokinase).
2. List the currently available dosage forms, including strength(s) and administration route(s), of each of these antithrombotic drugs.
3. Describe the mechanism of action of each of these antithrombotic drugs.
4. Summarize, by comparing and contrasting, the basic pharmacokinetic properties of each of these antithrombotic drugs, including absorption, distribution, route(s) of elimination, half-life, and time to full antithrombotic effect.
5. Define typical dosing requirements, dosing ranges, and monitoring requirements for each of these antithrombotic agents.
6. List the most common side effects, contraindications, and major adverse effects associated with each of these antithrombotic drugs.
7. List factors that increase the risk of adverse effects associated with each of these antithrombotic drugs.
8. List the major potential adverse effects associated with each of these antithrombotic drugs when used by pregnant or breast-feeding women.
9. Recognize clinically significant drug-drug and drug-food interactions documented to occur with each of these antithrombotic drugs. Explain the likely mechanism of the interaction, time course to clinical effect, and the effect the interaction may produce (e.g. increased or decreased antithrombotic response, bleeding risk, etc).
10. List the currently available drugs and blood products that may be used to reverse each of these antithrombotic drugs, and describe the mechanism of effect, onset of action, duration of action, dosing, dosage forms, including strength(s) and administration route(s), and potential adverse effects of each of the reversal agents.

Domain V
Operational (Administrative) Procedures

Goal: The Certified Anticoagulation Care Provider must possess the knowledge, skills, and competencies necessary to assist in the management of an anticoagulation service. This will include: (1) evaluating the need for anticoagulation services, (2) determining

personnel requirements, (3) developing a proposal for an anticoagulation service, (4) developing effective communication strategies with the patient and other members of the health care team, (5) documenting patient care activities, (6) performing quality assurance and risk management activities, (7) complying with state and federal regulations governing patient care and laboratory services, and (8) seeking compensation for anticoagulation therapy services. The Certified Anticoagulation Care Provider should be able to:

1. Identify the population, which will most benefit from anticoagulation monitoring services.
2. Identify appropriate criteria to define the role of each team member in the care of a patient taking antithrombotic therapy.
3. Identify goals for an anticoagulation management service and critical elements for a policy and procedure manual.
4. Identify potential sources of compensation for the services provided by an anticoagulation service and purpose of necessary billing codes (ICD-9 and CPT coding).
5. Identify key clinical outcomes indicators (e.g. bleeding and thromboembolic complications, INR performance measures) to evaluate the effectiveness of an anticoagulation service.
6. Justify the need and identify procedures for assuring continuing education and annual competency requirements on a periodic basis for all members of an anticoagulation service.
7. Develop criteria and measure patient satisfaction.
8. Define full and complete patient care documentation, including patient education and transitions between inpatient and outpatient services.
9. List the entities, which may govern the laboratory monitoring of antithrombotic therapy (e.g. Occupational Safety and Health Administration, Clinical Laboratory Improvement Amendments, Joint Commission on the Accreditation of Healthcare Organizations, National Committee for Quality Assurance, Healthcare Effectiveness Data and Information Set).
10. Identify the essential information regarding patients' anticoagulation status, which should be communicated periodically to primary care providers.
11. Identify policies and procedures that enable an efficient method for the anticoagulation service to order, track and obtain patient's laboratory results from any laboratory utilized by patient population.
12. Describe the elements and discuss use of patient contracts.

Resources and References

The National Certification Board for Anticoagulation Providers does not provide training to individuals who are seeking certification. Several training programs are available in the United States. The Board neither recommends nor endorses any specific training program or process of professional development. To prepare for the examination, candidates for certification should rely on the scientific evidence published in primary literature sources. Review articles and textbooks may also be helpful in preparation for the examination but candidates are responsible for the latest information regarding antithrombotic therapy. The Board expects candidates to be knowledgeable regarding all major scientific reports (except abstracts), which appear in peer-reviewed journals, published 6 or more months prior to the exam. Conversely, scientific works that appear in the literature less than 6 months prior to the examination will NOT be included on the examination.

Although the list below is not exhaustive, the Board considers the following sources of information as useful resources in preparation for the certification examination:

Journal Supplement:

ACCP Antithrombotic Guidelines 2008. Chest. 2008 Jun;133(6 Suppl).

This supplemental issue to the journal Chest is published a few months after each ACCP Consensus Conference on Antithrombotic Therapy (conducted every 2-3 years). This volume is a comprehensive review of the literature and international experts evaluate the weight of the evidence to develop practice recommendations. This is undoubtedly the single most important reference for anticoagulation care providers.

National Quality & Safety Perspectives:

Joint Commission website – http://www.jointcommission.org

NQF website – http://www.qualityforum.org

Textbooks:

Ansell JE, Oertel LB, Wittkowsky A, Eds. Managing Oral Anticoagulation Therapy: Clinical and Operational Guidelines. St Louis MO,(3nd edition). Wolters Klower, 2008.

Most comprehensive text available on all aspects of anticoagulation therapy management including clinical practice management, forms and flowsheets, basic physiology and pathophysiology, indications for treatment, technical aspects of coagulation testing, and much more. This is an invaluable reference.

Colman RW, Marder VJ, Clowes AW, George JN, Goldhaber SZ (eds). Hemostasis and Thrombosis: Basic Principals and Clinical Practice (5th edition). Lippincott Williams and Wilkins, Philadelphia, 2006.

This textbook is without a doubt the most comprehensive and exhaustive volume ever written regarding the pathophysiology and treatment of thrombosis. Although some information is outdated, this is an excellent source to study background information about hemostasis and the pathophysiology of thrombosis-associated disorders

Kitchens C, Alving B, Kessler C (eds). Consultative Hemostasis and Thrombosis (2nd edition). Saunders, Philadelphia, 2007.

Bates B. A guide to physical examination and history taking, 6th edition Physical assessment. A guide for evaluating drug therapy. Philadelphia: J.B. Lippincott Co, 1995.

This textbook is a classic and is widely used by medicine, nursing, and pharmacy schools to teach students basic physical examination techniques. There are many excellent physical examination textbooks available. If you don't feel comfortable with your physical examination skills, you should consider taking a refresher course or reviewing a physical assessment text.

Redman BK. The practice of patient education, 8th ed. St. Louis, Missouri: Mosby, Inc., 1997.

Reviews theories and principles of adult education.