



National Certification
Board for Anticoagulation
Care Providers

**Candidate Handbook
for
Certified Anticoagulation
Care Provider (CACP)**

Certified Anticoagulation Care Provider Candidate Handbook

This handbook was last revised in March 27, 2018. This handbook is valid for exams administered after May 1, 2018 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.
4. Creating a network of anticoagulation professionals to enhance clinical collaboration and decision making.

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 they practice.

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 antithrombotic drug pharmacology.
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.
5. A familiarity with the business and administrative issues common to anticoagulation management services.

Eligibility Requirements

To be eligible to take the CACP 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 their professional license for a minimum of 2 years prior to the application deadline and must provide a copy of an active, current United States (or territories) license, registration as a:

Registered Nurse (RN), Nurse Practitioner (NP), registered pharmacist (RPh), licensed physician (MD or DO), 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 as follows:

1. When completing the online application, the applicant must attest to having provided a minimum of 750 hours of **active** antithrombotic 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 activities pertaining to antithrombotic 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. Paragraph format should be used; a resume or curriculum vitae will not suffice. Duration and types of activities should be described, including, but not limited to the following:
 - practice setting
 - applicant's roles and responsibilities within the practice
 - number of patients within the practice
 - number of patients individually managed (either daily or weekly)
 - types of patients managed (ie. warfarin, DOAC, etc.)
 - other responsibilities pertaining to antithrombotic therapy management.

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

Some examples of experiences, which WILL be counted toward the professional experience requirement include (note: list is not exhaustive):

1. Drug Therapy Management
 - a. Ongoing monitoring of patients on anticoagulants and anti-platelets
2. Disease State Management
 - a. Assessment of patients suspected or at risk of having venous or arterial thromboses
 - b. Participation in the initial management of patients with thrombotic disorders with either pharmacological or non-pharmacological interventions
 - c. Ongoing monitoring of patients receiving anticoagulants in person in the inpatient and/or outpatient setting and/or via telephone/electronic means
 - d. Prescribing and adjusting anticoagulants and anti-platelets based on laboratory data and clinical criteria
 - e. Prevention and assessment of long term complications of venous thromboembolism
3. Transition and Coordination of Care
 - a. Peri-procedural management of anticoagulants and anti-platelets
 - b. Facilitation of transition of care between settings
4. Service Operational Performance
 - a. Perform quality checks on point of care instruments
 - b. Evaluate individual and population anticoagulation quality metrics
5. Patient and family education
 - a. Delivery of patient and family education of disease state, non-pharmacological management, and/or pharmacological management

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 antithrombotic medications or related equipment
- 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

NOTE: Supervising and managing other professionals may not be counted toward the professional experience requirement for first time applicants but may be counted towards recertification.

Rejected Applications

Applications may be rejected under the following circumstances:

- An applicant does not meet eligibility requirements
- The application is incomplete or improperly completed.

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 successfully met all eligibility requirements and has passed the examination. After notification of passing the CACP Examination, an individual may use the mark “CACP” following their name as long as they maintain 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 their 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 they apply in time to sit for an examination scheduled on or before the date on which their 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. With respect to the 750 hour requirement, the recertification applicant must be actively engaged in the delivery of care

to patients with venous and arterial thrombotic conditions. Delivery may include management and supervision of anticoagulation and antithrombotic services. 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.

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 vary. Please check with your testing site. 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 162 multiple-choice questions. Of these 162 questions, 150 are scored items, and 12 pilot test questions are included for validation for use on future exams. These 12 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, their 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 they are ready to view the first exam question. A timer is available for display onscreen during the exam. 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 they indicate that their 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 approximate domain breakdown below:

Domain I	Applied Pathophysiology of Thromboembolic Disease	25%
Domain II	Patient Assessment and Management	35%
Domain III	Patient Education	10%
Domain IV	Applied Pharmacology of Antithrombotic Agents	25%
Domain V	Operational (Administrative) Procedures	5%

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

Which of the following criteria BEST differentiates the specific role of each Anticoagulation Team member?

- a. Training, experience and patient care skill
- b. Number of patients seen per week
- c. Professional degree
- d. Faculty rank

Examination Scoring Process

As described previously, 150 of the 162 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 2 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 6 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, they may reapply by submitting a new application packet and exam fee using the then-current application procedure. There is no limit to the number of times unsuccessful candidates may take the Examination, provided eligibility requirements are in effect at the time of applying for re-examination.

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 and supporting documentation should be included with the request.

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
- Removing or attempting to remove exam content or any materials from the test center
- 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.

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 test on a scheduled exam date. Available exam dates and approved exam sites are posted on the NCBAP website. Note that the fee exam sites charge varies for administering and proctoring the exam. Confirm your fee directly with the testing site. 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 their 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 Nondiscrimination Policy

The NCBAP does not discriminate among applicants on the basis of age, gender, race, religion, country of origin, disability, sexual orientation, sexual identity and/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 <https://ncbap.org/application.aspx.html> and complete the electronic application.
 - a. This portion of the electronic application collects demographic/registration information and a description of current anticoagulation activities (500 words or fewer).
2. For faster processing of your application, you may upload the following documents via the online application:
 - b. A link to state licensing board website for verification of current US professional license
 - c. Signature statement provided in this packet

You also have the option of providing these documents by fax or email after completing the other portions of the electronic application.

3. 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 on screen and via email.

4. Once you have received your application ID, the following items may be submitted by fax to 312.896.5614 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 OR provide the web-link for your state license information and license number can be accessed
 - b. Signature statement provided in this packet
5. You will receive email confirmation once all materials have been received and uploaded to your application. This email indicates that your application is complete and has been submitted for review. Incomplete applications are not reviewed.
6. Application decisions will be communicated by email within approximately six weeks of application completion. Note that your application is not complete until all items have been received and filed with your application, including your supervisor verification. If you choose to fax items, those items do not become a part of your application until they are processed and uploaded to your application. For faster processing, you may choose to upload items to your application directly rather than faxing items. It is the applicant's responsibility to provide a current, valid email address. If notification is not received within 6-8 weeks of application completion, it is the responsibility of the applicant to check with the NCBAP by email (info@ncbap.org) or by phone (847.999.0484).
7. If your application is approved, your approval email will include instructions for scheduling your exam. You must take the CACP exam at an approved CACP exam site at a date/time approved by the NCBAP within 6 months of your application approval date. Your approval email will include information on approved exam sites and approved exam dates/times.
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.

Signature Statement

Please read, sign in ink, and date the statement below:

I certify that I have read the Candidate Handbook and understand that I am responsible for knowing its contents. I certify that the information provided via the online application and the documents provided to the NCBAP are complete and correct to the best of my knowledge and belief. I understand that if the information I have submitted is found to be incomplete or inaccurate, my application may be rejected or my examination results may be delayed, not released, or invalidated by National Certification Board of Anticoagulation Providers.

Signature

Date

Application Checklist

Did you:

1. Complete the online application?
2. Remit payment for the exam fee?
3. Receive an application ID?
4. Upload, fax or email
 - A photocopy of current US professional license? OR provide the web-link for your state license information and license number
 - Signature statement provided in this packet?
5. Include your application ID on all materials submitted by fax/email.

NCBAP

www.ncbap.org

Email: info@ncbap.org

Phone: 847.999.0484

Fax: 312.896.5614

Appendix

The approximate domain distribution of the exam is as follows:

Domain I	25%
Domain II	35%
Domain III	10%
Domain IV	25%
Domain V	5%

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, thrombolytic proteins, and the clotting cascade. Identify the intrinsic (contact) pathway, extrinsic pathway (tissue factor), the common pathway including the major functions of thrombin and fibrin.
2. Explain how vitamin-K dependent coagulation proteins (including proteins C and S) are produced, 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 vitamin K antagonists and how their time to depletion influences the selection and duration of anticoagulation therapy in the prevention and treatment of thromboembolism.
3. Describe the interplay between direct-acting oral anticoagulants (DOACs) and clotting factors within the coagulation cascade.
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 (heparin induced thrombocytopenia, immune thrombocytopenia, thrombotic thrombocytopenia purpura).
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. Assess the risks and recommend appropriate interventions for venous thromboembolism prophylaxis and describe the consequences of failing to complete venous thromboembolic risk assessment, including familiarization with validated risk assessment tools.
9. Recognize the most frequent signs and symptoms of deep vein thrombosis and pulmonary embolism.
10. Recognize the most frequent signs and symptoms of peripheral vascular disease, including thrombotic or embolic causes of acute limb ischemia.
11. Describe the objective diagnostic and laboratory tests that may be employed to diagnose and/or risk stratify deep vein thrombosis and pulmonary embolism, and recognize factors that influence their interpretation, including venous risk assessment probability scores (ie. Well's score, PESI score, etc.)
12. List the most frequent signs and symptoms of the post-thrombotic (post-phlebotic) syndrome, state how the syndrome may be distinguished from acute deep vein thrombosis, and recognize therapeutic modalities to minimize the symptoms of this syndrome.
13. List risk factors, signs, and symptoms of atrial fibrillation and atrial flutter. Understand how stroke and bleeding risk assessments (e.g. CHA2DS2-VASc and HAS-BLED) apply to clinical care of atrial fibrillation patients.
14. 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.
15. 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.
16. List the most frequent signs and symptoms of heart failure, and recognize the effect of exacerbations of heart failure on anticoagulant therapy.
17. Identify the risks factors for and list the most frequent signs, symptoms and clinical presentation of coronary artery disease and cardiac ischemia/infarction.
18. Explain the pathophysiology, relative risk and clinical presentation of thrombosis associated with inherited and acquired hypercoagulable conditions (protein C deficiency, protein S deficiency, antithrombin III deficiency, factor V Leiden, activated protein C resistance, prothrombin gene mutation, elevated factor VIII, hyperhomocysteinemia, antiphospholipid antibody syndrome, and occult malignancy.)

19. Interpret the results of hypercoagulability screening tests, identify factors that can influence the test 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 and thrombolytic agents including FDA approved indications as well as the grades of published recommendations.
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., age, weight, peptic ulcer, intracranial hemorrhage, congestive heart failure, renal function, hepatic function, etc.)
4. Identify potential barriers to successful use of anticoagulation medications and management (e.g., financial hardship, transportation, literacy, health literacy, communication, language barrier, etc.)
5. Given a specific patient history including co-morbid diseases, perform a benefit and risk analysis regarding the use of antithrombotic and thrombolytic agents.
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). Understand the differences associated with point of care fingerstick INR testing and venous testing and how this may affect the correlation between INR values.

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), thrombin time (TT), anti-Xa activity, heparin assay, chromogenic factor X level, creatinine clearance, hemocult 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 factor 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. Be able to identify which of the above mentioned tests require the patient to be fully anticoagulated vs completely off any form of anticoagulant, including the appropriate hold duration.
13. Make appropriate decisions when adjusting antithrombotic therapy to improve anticoagulation control (i.e., tailor dosage adjustments based on patient-specific 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 and/or transitioning or converting between agents.
18. Develop a plan for systematic, continuous follow up care (i.e., management and coordination) for patients on antithrombotic 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, etc.)
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) and drug-disease 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. Identify current approved available methods to reverse anticoagulant therapy.
23. Identify risk factors for the development of thromboembolism. Appropriately assess a patient at risk and describe appropriate management strategies.
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 or specific non-discontinuation of antithrombotic therapy (e.g. dental procedures, surgery, colonoscopy, etc.)
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/INR monitors.
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, etc.) including the signs and symptoms of myocardial infarction and cerebrovascular accident.
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 thrombosis 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 affect 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. Involving the patient and/or family in the educational process can reduce the risk of adverse events associated with the use of antithrombotic drugs. 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. 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 effects, importance of periodic blood testing to monitor the therapeutic effect, what to report to the anticoagulation manager or clinic and other safety issues.
3. Evaluate family / social supports and the potential impact on the educational process.
4. Describe the educational needs of special populations (e.g. children, elderly, mentally impaired, language or health literacy barriers.)
5. Identify appropriate methods to determine a patient's knowledge, skill, attitudes, and understanding regarding antithrombotic / thrombolytic therapy.
6. Identify appropriate educational materials and determine methods to obtain them and how to best incorporate them into a teaching plan.
7. Recognize behaviors that may be an indicator for non-adherence to antithrombotic therapy and develop appropriate educational interventions.
8. Identify community resources to reinforce / augment plan of care.
9. Develop a list of specific learning objectives regarding the use of point-of-care testing devices.
10. Provide education regarding antithrombotic / thrombolytic 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 and Thrombolytic Agents

Goal: The Certified Anticoagulation Care Provider must possess and maintain an in- depth knowledge regarding the pharmacologic properties of antithrombotic / thrombolytic 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 used in clinical practice for the prevention and/or treatment of arterial and venous thrombosis.
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 and pharmacodynamic properties of each of these antithrombotic drugs, including absorption, distribution, route(s) of elimination, half-life, time to full therapeutic effect and potential impact of genetic polymorphisms.
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 / thrombolytic 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, drug-food and drug-disease 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 antithrombotic / thrombolytic services. 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 populations which will most benefit from anticoagulation monitoring services.
2. Identify appropriate criteria to define the role and responsibilities of each team member in the care of a patient taking antithrombotic / thrombolytic therapy.
3. Identify goals for an antithrombotic / thrombolytic 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-10 and CPT coding).
5. Identify key quality metrics or benchmarking parameters (e.g. bleeding and thromboembolic complications, INR performance measures, compliance) to evaluate the effectiveness of an antithrombotic / thrombolytic 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 antithrombotic therapy (e.g. Occupational Safety and Health Administration, Clinical Laboratory Improvement Amendments, Joint Commission, National Committee for Quality Assurance, Healthcare Effectiveness Data and Information Set, National Quality Forum, Agency for Healthcare Research and Quality, Centers for Medicare & Medicaid Services).
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.
13. Describe the role of Independent Diagnostic Testing Facilities (IDTFs) in facilitating patient self-testing.

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 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:

Antithrombotic Therapy and Prevent of Thrombosis, 9th Ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines 2012; Chest 141(2) (Suppl).

The American Society of Hematology Clinical Practice Guidelines. Available at:
<http://www.hematology.org/Clinicians/Guidelines-Quality/Guidelines.aspx>

Kearon D et al. Antithrombotic Therapy for VTE Disease: CHEST Guideline and Expert Panel Report. CHEST 2016; 149(2):315-352. (<https://doi.org/10.1016/j.chest.2015.11.026>)

Management of Venous Thromboembolism: Clinical Guidance from the Anticoagulation Forum. Journal of Thrombosis & Thrombolysis Volume 41, Issue 1, January 2016. Available at:
<https://link.springer.com/journal/11239/41/1/page/1>.

Ruff CT et al North American Thrombosis Forum, AF Action Initiation Consensus Document. The American Journal of Medicine (2016) 129, S1-S29

Burnett AE et al. Guidance for the practical management of the direct oral anticoagulants (DOACs) in VTE treatment. J Thromb Thrombolysis (2016) 41:206–232, DOI 10.1007/s11239-015-1310-7

2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation: Executive Summary. *Circulation*. 2014;130:2071-2104
Martins RP et al. Defining nonvalvular atrial fibrillation: A quest for clarification. *Am Heart J* 2016;178:161-7

Fauchier L et al. How to define valvular atrial fibrillation? *Archives of Cardiovascular Disease* (2015) 108, 530—539

National Quality & Safety Perspectives:

Anticoagulation Forum Centers of Excellence: <http://excellence.acforum.org>

Join Commission website – <http://www.jointcommission.org>

National Quality Forum (NQF) – <http://www.qualityforum.org>

The Healthcare Effectiveness Data and Information Set (HEDIS), The National Committee for Quality Assurance (NCQA) – www.ncqa.org

Centers for Medicare & Medicaid Services – www.CMS.gov

Textbooks:

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

A comprehensive text on primarily the aspects of anticoagulation therapy management with warfarin including clinical practice management, forms and flowsheets, basic physiology and pathophysiology, indications for treatment, technical aspects of coagulation testing, and much more. This is a helpful, but not entirely current, reference.

Marder VJ, Aird WC, Bennett JS, Schulman S, White GC (eds). *Hemostasis and Thrombosis: Basic Principles and Clinical Practice* (6th edition). Lippincott Williams and Wilkins, Philadelphia, 2012.

This textbook is a comprehensive and exhaustive volume 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, Konkle B, Kessler C (eds). *Consultative Hemostasis and Thrombosis* (3rd edition). Wolters Kluwer, Lippincott Williams and Wilkins, 2013.

This book is a clinically focused text on management of bleeding and clotting disorders.

Bickley L. Bates' guide to physical examination and history taking, 12th edition. Philadelphia: J Lippincott Williams and Wilkins, 2016.

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.

Lau JF, Barnes GD, Streiff MB (eds). Anticoagulation Therapy (1st edition). Springer, 2018. ISBN 3319737082

This textbook presents the latest evidence and guidelines supporting the use of anticoagulant therapy for various clinical scenarios. Organized in two parts, this book reviews the pharmacologic properties of various anticoagulants and details the clinical applications of anticoagulant therapy.