

**Clinical Core
Curriculum**

Introduction

The International Society on Thrombosis and Haemostasis (ISTH) developed the Clinical Core Curriculum to outline the skills and competencies required by a clinical specialist in thrombosis and hemostasis. The curriculum provides a framework for clinicians training in this field, enables harmonization of clinical training and informs the structuring of continuous professional development. It will help clarify the boundary between general/malignant hematology and the field of thrombosis and hemostasis.

The Curriculum focuses on the competencies considered to be required by the clinician at the particular stage in his or her career to ensure that they are able to fulfill the specific requirements of the role. The skill level required for different aspects of thrombosis and hemostasis will generally relate to the relative frequency with which the condition is encountered in practice. Regional adaptations may be required to respond to variations in disease incidence and prevalence.

A global survey was used to determine consensus on the competency levels considered to be required for a junior clinical specialist in thrombosis and hemostasis, one who is ready to practice as an independent specialist in the field.

Competency Levels



Knows how: able to explain how and why they do something or understand the principles.

Clinicians are able to identify the important issues, describe patients who may have the condition and describe relevant diagnostic tests. They may not always have seen a patient with the condition. A basic level of training requires clinicians to have a certain body of knowledge. However, junior specialist clinicians will need to know how to apply that knowledge and have developed skills that allow them to acquire information from patients as well as laboratory and radiology investigations, which enable them to synthesize a rational diagnostic or management plan.



Shows how: able to identify competence in a simulated scenario or artificial situation.

Clinicians are able to: identify symptoms and signs in patients with the disorder; correctly interpret test results that will identify patients with the disorder; and describe prognosis and treatment or appropriate referral routes. For certain disorders, clinicians should be able to demonstrate how they would manage patients in a clinical setting, although they may not have actually seen a patient with the disorder. Regarding laboratory tests relating to a disorder, they should be able to describe the sensitivity and specificity of the tests, its limitations and costs.



Does: able to demonstrate mastery in a real clinical situation.

Clinicians have first-hand experience of patients with these disorders and take responsibility for first-line management of patients with the disorder including enrollment in clinical trials and identification of treatment failures.

knows how

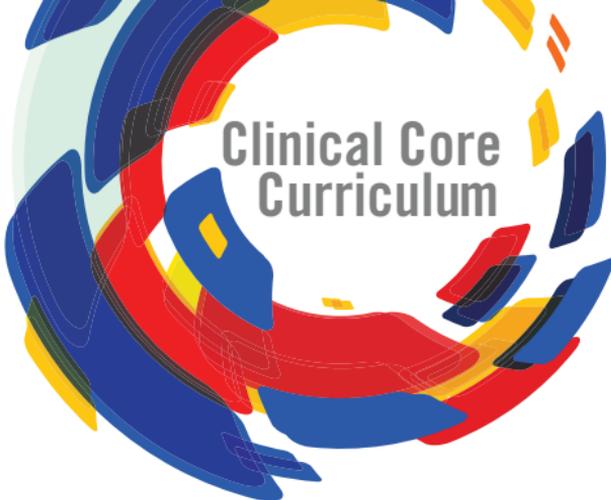


shows how



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Specialties

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- ● ● 1 Role of thrombosis and hemostasis specialist

 - 2 Laboratory practice

 - ● 3 Clinical trials and research

 - ● 4 Bleeding disorders

 - 5 Platelet disorders

 - ● ● 6 Hemophilia A and B

 - ● ● 7 von Willebrand disease (VWD)

 - ● 8 Rarer bleeding disorders

 - ● ● 9 Immune-mediated acquired bleeding disorders

 - ● ● 10 Thrombotic disorders – hypercoagulable states
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	11	Clinical aspects of venous thromboembolism (VTE)
	12	Clinical aspects of arterial thrombosis
 	13	Antithrombotic agents
  	14	Plasma-derived and recombinant therapeutic agents
 	15	Obstetrics and gynecology
  	16	Intensive care
	17	Oncology
 	18	Hematological diseases
	19	Neurology
	20	Nephrology
	21	Infectious diseases
	22	Gastroenterology and liver disease
 	23	Cardiology and cardiovascular surgery
 	24	General and orthopaedic surgery
	25	Traumatology
 	26	Blood transfusion
	27	Pediatrics

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1 Role of thrombosis and hemostasis specialist

- 1 Provide general consultative support on issues relating to thrombosis and hemostasis to other medical specialties

 - 2 Take direct responsibility for the care of patients with venous thromboembolism (VTE)

 - 3 Provide support and advice for management of patients with arterial thrombosis

 - 4 Take direct responsibility for the provision and management of comprehensive clinical care of patients with hemophilia and other hereditary and acquired bleeding disorders

 - 5 Provide leadership and management of a hospital or community anticoagulant service to ensure that patients receive an appropriate level of antithrombotic therapy
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- 6 Take direct responsibility for provision and management of a diagnostic coagulation laboratory service, including quality control

- 7 Contribute to teaching in the area of thrombosis and hemostasis

- 8 Contribute to research in the area of thrombosis and hemostasis

- 9 Take part in clinical audit

- 10 Engage in ongoing professional development processes

- 11 Participate in interdisciplinary team meetings

- 12 Apply understanding of the fibronolytic process to clinical management of patients with bleeding and/or clotting disorders

- 13 Record and report adverse events and unexpected complications to local and national pharmacovigilance agencies and the pharmaceutical industry

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2 Laboratory practice

- 1 Apply the basic principles of laboratory management (e.g. setting of normal ranges, quality assurance, laboratory computing, health and safety and accreditation)

 - 2 Apply the principles of the impact of pre-analytical and analytical variables to the interpretation of laboratory results

 - 3 Manage and apply laboratory testing relating to thrombosis and hemostasis including issues relating to instruments, methods and their pitfalls
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3 Clinical trials and research

- 1 Identify practice areas for research

- 2 Follow national and international clinical trial legislation and guidelines

- 3 Apply the principles of study design types, such as pharmaceutical / investigator-initiated, and the different

phases of clinical trials to the development and interpretation of clinical trials

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- 4 Participate in clinical studies related to the field of thrombosis and hemostasis
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4 Bleeding disorders

- 1 Take a relevant and accurate personal and family bleeding history incorporating a standardized bleeding score when appropriate
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- 2 Perform a focused clinical examination to assess for abnormal bleeding
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- 3 Formulate a comprehensive differential diagnosis and management plan for patients with abnormal bleeding
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- 4 Interpret laboratory test results for investigation and diagnosis of bleeding disorders
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- 5 Provide genetic counseling to patients with inherited bleeding disorders
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- 6 Use the results of laboratory investigations to distinguish non-accidental injury from a bleeding disorder

- 7 Develop and implement long term management plans for patients with inherited bleeding disorders

5 Platelet disorders

- 1 Develop and apply a diagnostic pathway for patients with thrombocytopenia

- 2 Diagnose and manage patients with immune thrombocytopenia (ITP) applying indications for treatment and treatment options

- 3 Diagnose and manage patients with drug-induced platelet disorders

- 4 Diagnose and manage patients with hereditary disorders of platelet function

- 5 Diagnose and manage patients with disorders of platelet function in association with hematological disorders and other organ failure

- 6 Diagnose and manage patients with thrombotic thrombocytopenic purpura (TTP) and other microangiopathic disorders

- 7 Diagnose and manage patients with heparin-induced thrombocytopenia (HIT)

6 Hemophilia A and B

- 1 Apply their understanding of the epidemiology and molecular basis of hemophilia to clinical management of patients with this disorder

- 2 Relate the impact of the history of hemophilia and the evolution of replacement therapy to issues relating to clinical management of patients affected by hemophilia

- 3 Relate the principles of the structural and functional aspects of the biology of factor VIII (FVIII) and factor IX (FIX) to clinical management of patients with hemophilia A or B

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- 4 Recognize clinical manifestations of hemophilia

- 5 Diagnose hemophilia A and B by interpreting laboratory tests

- 6 Perform laboratory tests for diagnosis of hemophilia A and B

- 7 Provide hemophilia treatment such as delivery of replacement therapy (primary and secondary prophylaxis, on-demand therapy of bleeds)

- 8 Relate the principles of the epidemiology, immunology and molecular basis of inhibitors to FVIII, or FIX to clinical management of patients with hemophilia A or B

- 9 Diagnose patients with inhibitors to FVIII and FIX by interpreting laboratory tests

- 10 Perform laboratory tests for inhibitors to FVIII and FIX

- 11 Manage patients with inhibitors to FVIII and FIX

- 12 Manage dosing regimens for immune tolerance induction in patients with inhibitors, as well as in the use of immunosuppressive drugs, apheresis and immunoadsorption

- 13 Provide management plans for peri-operative hemostatic support in patients with hemophilia requiring surgery

- 14 Provide management plans for dental procedures in patients with hemophilia

- 15 Provide management plans for physiotherapists for prevention and treatment of arthropathy in hemophilia patients

- 16 Provide advice for management of hemostasis in symptomatic carriers of hemophilia A and B requiring surgery

- 17 Manage issues relating to transfusion-transmitted diseases especially HIV and HCV in patients with bleeding disorders in collaboration with appropriate specialists

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○ 18 Apply their understanding of gene therapy and molecular engineering of FVIII and FIX to clinical management of patients with hemophilia A and B

○ 19 Appreciate the issues relating to the provision of hemophilia care in different parts of the world and the difficulties of providing diagnostic and therapeutic services in some countries

○ 20 Provide a comprehensive care service for patients with hemophilia

7 Von Willebrand disease (VWD)

○ 1 Relate the understanding of the incidence, inheritance, classification (including molecular and genetic aspects), clinical manifestations, natural history and clinical complications to patients with VWD

○ 2 Relate the understanding of the structural and functional aspects of the biology of von Willebrand factor (including cellular processing and interactions with

platelets, endothelium and FVIII) to diagnosis and management of patients with VWD

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-  3 Diagnose and classify VWD by interpretation of laboratory tests

 -  4 Perform laboratory tests for diagnosis and classification of VWD

 -  5 Develop clinical management plans for patients with VWD

 -  6 Manage treatment of bleeds in patients with VWD, including use of desmopressin acetate, FVIII/VWF concentrates, cryoprecipitate, antifibrinolytics and fibrin glue

 -  7 Diagnose and treat patients with VWD and inhibitors
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Rarer bleeding disorders

-  1 Relate their understanding of the pathophysiological mechanisms, incidence, inheritance, clinical

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manifestations and treatment of deficiencies of factor II, V, VII, X, XI, XIII, and other isolated and combined rare bleeding disorders to clinical management of patients with these disorders

- 2 Diagnose rare bleeding disorders by interpreting laboratory tests

 - 3 Manage on demand and prophylactic treatment of rare bleeding disorders

 - 4 Manage patients with rare bleeding disorders during pregnancy, surgery and other interventions

 - 5 Apply their understanding of techniques for molecular diagnosis and prenatal diagnosis to management of families with rare factor deficiencies
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9 Immune-mediated acquired bleeding disorders

- 1 Diagnose patients with acquired coagulation factor inhibitors by interpreting laboratory tests
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- 2 Perform laboratory tests used to diagnose patients with acquired coagulation factor inhibitors
- 3 Recognize and manage patients with acquired coagulation factor inhibitors such as acquired hemophilia, VWD and other acquired inhibitors

- 4 Manage bleeds in association with acquired coagulation factor inhibitors including acquired hemophilia, VWD and other acquired inhibitors

- 5 Develop a management plan for eradication of the acquired coagulation factor inhibitors

10 Thrombotic disorders - hypercoagulable states

- 1 Apply their understanding of the epidemiology and molecular basis of thrombotic disorders to individuals affected by these disorders
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- 2 Take a relevant and accurate personal and family clotting history

- 3 Diagnose hypercoagulable states (inherited and acquired) by interpreting laboratory tests

- 4 Perform laboratory tests for diagnosis of hypercoagulable states (inherited and acquired), including antiphospholipid syndrome (APS) and heparin-induced thrombocytopenia (HIT)

- 5 Interpret the clinical relevance of heritable thrombophilias to thrombotic disorders

- 6 Interpret the clinical relevance of laboratory markers suggested to be risk factors for thrombosis

11 Clinical aspects of venous thromboembolism (VTE)

- 1 Develop and apply a diagnostic pathway for patients with suspected VTE
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- 2 Develop a treatment plan for patients with acute VTE in all locations including catheter-related thrombosis

- 3 Diagnose and manage patients with superficial venous thrombosis

- 4 Diagnose and manage patients with thrombosis due to antiphospholipid syndrome

- 5 Diagnose and manage patients with thrombosis at unusual sites (e.g. mesenteric, cerebral, portal vein thrombosis)

- 6 Assess risk factors and risk of recurrence in patients with acute VTE

- 7 Recognize and manage patients with post-thrombotic syndrome

- 8 Develop and apply recommendations for thromboprophylaxis, including mechanical and pharmacological interventions, in patients at risk of venous thromboembolism e.g. peri-operative and post-traumatic period, and other periods of immobility

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12 Clinical aspects of arterial thrombosis

- 1 Relate the principles of the epidemiology of arterial thrombosis to clinical care of individuals affected by these disorders

- 2 Evaluate and manage patients with arterial thrombosis, including cardio- and cerebrovascular risk factors and hemostatic variables as predictors of risk

13 Antithrombotic agents

- 1 Apply their understanding of the mechanisms of action and therapeutic indications for anticoagulant agents in management of individuals who require these medications

- 2 Manage patients receiving anticoagulants, including advice on duration and intensity and interactions with other medications

- 3 Interpret tests for anticoagulant control (e.g. INR, aPTT, anti-Xa levels, thrombin clotting time)

- 4 Manage anticoagulation and antiplatelet therapy in association with invasive procedures

- 5 Manage patients with anticoagulant-associated bleeding

- 6 Manage patients on antiplatelet agents, including aspirin, dipyridamole, thienopyridine derivatives and glycoprotein IIb/IIIa inhibitors

- 7 Manage patients on fibrinolytic drugs, including streptokinase, urokinase, t-PA

14 Plasma-derived and recombinant therapeutic agents

- 1 Manage clinical use of plasma components such as fresh-frozen plasma, cryoprecipitate, and prothrombin complex concentrates (PCCs)

- 2 Manage clinical use and choice of plasma-derived and recombinant factor concentrates

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- 3 Manage clinical use of replacement with bypassing agents (activated PCC and rVIIa)

- 4 Relate issues concerning licensing legislation to the use of plasma-derived and recombinant concentrates and their “off-label” use

- 5 Understand the principles for preparation of plasma-derived and recombinant factor concentrates

- 6 Relate principles concerning the safety of blood products including elimination methods of infectious agents and relevant national regulations to the clinical use of these agents

15 **Obstetrics and gynecology**

- 1 Relate the effects of pregnancy and the postpartum, oral contraceptive and hormone replacement therapy on hemostatic parameters to clinical management of patients
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- 2 Develop and implement anticoagulant regimens for use during pregnancy and postpartum

- 3 Investigate women for relevant hemostatic factors involved in placenta-mediated pregnancy complications (preeclampsia, fetal loss, stillbirth, placental abruption)

- 4 Diagnose and manage women with obstetric manifestations of the antiphospholipid syndrome

- 5 Manage the anticoagulation of pregnant women with mechanical prosthetic heart valves

- 6 Assess and manage gynecological and obstetric issues in women with inherited bleeding disorders

- 7 Manage hematological aspects of postpartum hemorrhage

- 8 Diagnose and manage thrombocytopenia in pregnant women

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- 9 Diagnose and manage women with fetal and neonatal alloimmune thrombocytopenia in conjunction with obstetric and neonatal specialists

- 10 Provide evaluation of hemostasis in women with menorrhagia

16 Intensive care

- 1 Diagnose and manage patients with disseminated intravascular coagulation or consumptive coagulopathy

- 2 Manage the hemostatic aspects of the pathophysiology and clinical management of sepsis and shock

- 3 Manage anticoagulation in intensive care unit patients

- 4 Manage anticoagulation for veno-arterial extracorporeal membrane oxygenation

17 Oncology

- 1 Diagnose and manage the hemostatic and thrombotic complications associated with malignancy and its treatment
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18 Hematological diseases

- 1 Diagnose and manage hemostatic and thrombotic complications patients with myeloproliferative neoplasms such as polycythemia and essential thrombocythemia
 - 2 Manage the thrombotic complications of red cell disorders including hemoglobinopathies, red cell membrane disorders and PNH
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19 Neurology

- 1 Assess VTE risk and develop thromboprophylaxis plans for patients with neurological disorders
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○ 2 Diagnose and manage patients with cerebral venous thrombosis

○ 3 Manage antithrombotic therapy in patients with ischemic stroke including anticoagulation, antiplatelet agents and thrombolysis

○ 4 Evaluate patients with unexplained ischemic or hemorrhagic stroke

20 Nephrology

○ 1 Diagnose and manage the hemostatic and thrombotic defects associated with renal failure and renal transplantation

○ 2 Manage anticoagulation in patients on dialysis

21 Infectious diseases

○ 1 Manage hemostatic problems in patients with infectious diseases, which are prevalent in developing countries such as dengue fever, malaria and leptospirosis

22 Gastroenterology and liver disease

- 1 Diagnose and manage patients with vitamin K deficiency

- 2 Diagnose and manage hemostatic and thrombotic problems in patients with liver disease

23 Cardiology and cardiovascular surgery

- 1 Manage thromboembolism prevention and anticoagulation in patients with atrial fibrillation

- 2 Manage anticoagulation of patients with prosthetic heart valves

- 3 Manage anticoagulation with antiplatelet drugs and thrombolytics in patients with acute coronary syndromes, acute myocardial infarction and percutaneous coronary interventions

- 4 Manage the hemostatic complications of cardiac bypass surgery

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24 General and orthopaedic surgery

- 1 Develop management plan for invasive procedures for patients with abnormal coagulation tests

- 2 Assess and manage patients with intra or postoperative bleeding

- 3 Assess VTE risk and develop thromboprophylaxis plans for general and orthopaedic surgery patients

25 Traumatology

- 1 Assess and manage patients with traumatic coagulopathy

26 Blood transfusion

- 1 Manage the hemostatic alterations of massive transfusion

- 2 Diagnose and manage patients with post-transfusion purpura

- 3 Investigate and manage transfusion reactions

- 4 Apply the principles of apheresis, including plasma exchange and immunoadsorption, to clinical management of individuals who require these therapies

- 5 Relate issues concerning transfusion-transmissible infections i.e. non-viral agents, viral infectious agents, prions to clinical use of blood products

- 6 Relate issues concerning the content, preparation and preservation of standard and special blood components to clinical use of these blood products

27 Pediatrics

- 1 Relate knowledge of developmental hemostasis to the interpretation of laboratory coagulation tests for clinical management of neonates and children
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- 2 Diagnose and manage hemorrhagic disease of the newborn, including vitamin K deficiency

- 3 Diagnose and manage thrombocytopenia in neonates and children

- 4 Diagnose and manage thrombosis in neonates and children

Notes

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About the ISTH Clinical Core Curriculum

The Clinical Core Curriculum should be used as a framework for national and regional thrombosis and hemostasis societies to map their own curricula. Specialist clinical groups including hematology, cardiology, and vascular medicine can use the Curriculum as a template to develop training programs responsive to specific local and regional needs and resources. The national, regional and specialist groups can determine the methods of assessment for these competencies based on local statutory bodies.

The Curriculum was developed and reviewed by an international body of experts to engage the global thrombosis and hemostasis community and to encourage a sense of ownership of the Curriculum amongst its members. It will be reviewed and updated periodically by the ISTH Education Committee as competencies change or develop in the field.

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