

A Haematology Curriculum for Medical Students

Education Committee of the British Society for Haematology

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This curriculum is intended to act as a guide both to students and medical schools as to the extent and depth of knowledge of haematology that would be expected of newly-qualified doctors commencing their first posts. It is expected that this knowledge will be acquired during both the pre-clinical and the clinical years

AIMS

The acquisition of knowledge, skills and experience of haematology relevant to a non-specialist (e.g. foundation level doctor).

PREREQUISITES

The student requires an appropriate knowledge of anatomy and physiology and a basic knowledge of cell biology including the structure and function of cells, and the nature and function of chromosomes and genes.

OBJECTIVES COMPRISING THE CORE CURRICULUM

- **Physiology of blood; terminology and normal ranges**

The student should be able to:

- Explain the basics of haemopoiesis and the functions of the main blood cell types.
- Explain the concepts of a normal range and be able to assess whether a laboratory test is likely to be normal or abnormal.

- **Use of the laboratory**

The student should be able to:

- Request appropriate haematology tests and provide appropriate samples for such tests with relevant clinical information.
- Interpret results of haematology tests, develop a differential diagnosis and plan further appropriate investigations.

- **Mechanisms of anaemia**

The student should be able to:

- Explain the term anaemia and understand the important causes of microcytic, normocytic and macrocytic anaemias.
- Explain the common causes of a haemolytic anaemia and the basic investigations to request.
- Explain the significance of the reticulocyte count.

- **Haematinic deficiency and the anaemia of chronic disease**

The student should be able to:

- Describe the haematological investigations in patients with suspected haematinic deficiency (e.g. iron, vitamin B12 or folate deficiency), the common clinical features and the important underlying causes of these disorders.
 - Describe the role and complications associated with haematinic replacement treatment.
 - Describe the clinical and haematological features of the anaemia of chronic disease and explain how this is distinguished from iron deficiency.
 - Explain the common haematological abnormalities (e.g. anaemia, elevated erythrocyte sedimentation rate) that can occur in patients with non-haematological systemic diseases.
- **Thalassaemias and haemoglobinopathies**
The student should be able to:
 - Explain the haematological abnormalities of patients with haemoglobinopathies (e.g. alpha and beta thalassaemia trait, thalassaemia major and sickle cell disease) and explain the important clinical features and complications of these disorders.
 - Explain the significance of sickle cell trait.
- **Disorders of white cells**
The student should be able to:
 - Describe the common causes of leucocytosis and leucopenia.
 - Describe the common causes and clinical significance of neutropenia, neutrophilia, lymphocytosis and eosinophilia.
- **Obstetric haematology**
The student should be able to:
 - Describe the changes that occur in haematological values in pregnancy.
 - Describe the role of maternal testing in predicting fetal haemoglobinopathies and thalassaemias.
 - Explain how Rh D alloimmunisation can be avoided.
- **Paediatric haematology**
The student should be able to:
 - Explain how healthy neonates and children differ haematologically from adults.
 - Describe the common acquired and inherited causes of anaemia in childhood.
 - Describe the common causes of bruising and bleeding in both the neonatal period and during childhood.
- **Haemostasis overview**
The student should be able to:
 - Take a competent history from a patient with a history of thrombosis or abnormal bleeding or bruising and describe the common inherited and acquired causes of thrombosis and bleeding.
 - Explain the tests in a coagulation screen and their limitations.
- **Thrombosis – venous and arterial**
The student should be able to:
 - Explain the epidemiology, diagnosis and management of venous thromboembolism including primary and secondary prevention.
 - Explain the inherited and acquired risk factors for venous thromboembolism.
 - Discuss the risk factors for arterial thrombosis.

- Describe the mode of action, monitoring blood tests and complications of the currently used anticoagulant and anti-platelet drugs.
- **Inherited Bleeding Disorders**
The student should be able to:
 - Explain the basic clinical and laboratory abnormalities of patients with inherited bleeding disorders (e.g. haemophilia and von Willebrand disease).
- **Acquired Bleeding Disorders**
The student should be able to:
 - Explain how to diagnose and manage patients with overdoses of anticoagulants who are bleeding as well as those who are not bleeding.
 - Describe the coagulopathy associated with liver disease, renal disease, massive blood loss and disseminated intravascular coagulation, and explain the basic principles of management of these conditions.
- **Thrombocytopenia**
The student should be able to:
 - Describe the mechanisms and common causes of thrombocytopenia.
 - Describe the presenting symptoms, signs and blood count abnormalities of autoimmune ('idiopathic') thrombocytopenic purpura (ITP).
 - Describe the presenting symptoms, signs and blood test abnormalities of thrombotic thrombocytopenic purpura (TTP) and recognise the need for urgent treatment.
- **Blood groups and antibodies**
The student should be able to:
 - Describe the ABO and Rh D antigens and antibodies.
 - Explain the significance of allo-antibodies in relation to blood transfusion and haemolytic disease of the newborn.
 - Explain how to take and label blood samples and request blood components for transfusion and recognise the time scales to obtain blood components.
 - Explain what is meant by 'G and S' (group and screen), crossmatch (compatibility tests) and electronic issue.
 - Explain how blood products are safely stored and administered.
 - Explain how volunteer donors are recruited and screened.
- **Safe and appropriate prescribing of blood components and products**
The student should be able to:
 - Discuss the indications for red cell transfusion.
 - Discuss the indications for platelet transfusion.
 - Discuss the indications for the use of fresh frozen plasma (FFP), cryoprecipitate and prothrombin complex concentrate.
 - Recognise that some patients require special blood components (e.g. irradiated components).
 - Discuss the management of massive blood loss.
 - Discuss alternatives to blood transfusion and the need to conserve the blood supply.
- **Complications of blood product transfusion**
The student should be able to:
 - Discuss the complications of transfusion and their prevention, diagnosis and management

Immunological

- ABO mismatch
- Delayed haemolytic transfusion reactions
- Transfusion-related acute lung injury (TRALI)
- Anaphylaxis
- Non-haemolytic febrile transfusion reactions

Non-Immunological

- Transfusion-associated circulatory overload (TACO)
- Transmission of infection.

- **Lymphadenopathy**

The students should be able to:

- Discuss the common causes of lymphadenopathy.

The students should be able to:

- Outline the functions of the spleen.
- List the important causes and management of hypersplenism
- Discuss the mechanisms and causes of splenomegaly

- **Hodgkin and non-Hodgkin lymphomas**

The student should be able to:

- Describe the common clinical features and course of Hodgkin and non-Hodgkin lymphoma.

- **Multiple myeloma and MGUS (Monoclonal Gammopathy of Uncertain Significance)**

The student should be able to:

- Describe the basic haematological, biochemical, immunological and clinical features of multiple myeloma.
- Distinguish between multiple myeloma, MGUS and benign polyclonal hypergammaglobulinaemia.
- Outline the very basic pathological and clinical features of primary amyloidosis.

- **Acute and chronic leukaemias**

The student should be able to:

- Outline the natural history and presenting clinical and haematological features of acute leukaemias.
- Explain how to recognise and treat neutropenic sepsis.
- Describe the haematological and clinicopathological features of chronic lymphocytic leukaemia and chronic myeloid leukaemia.

- **Myelodysplastic syndromes**

The student should be able to:

- Outline the clinical and haematological features of the myelodysplastic syndromes.

- **Myeloproliferative neoplasms (myeloproliferative disorders)**

The student should be able to:

- Outline the differential diagnosis in a patient with a raised haemoglobin concentration and discuss the clinical and laboratory features that help to distinguish polycythaemia vera from other causes of a high haemoglobin concentration.

- Outline the main laboratory and clinical features of essential thrombocythaemia and discuss the clinical and laboratory features that help to distinguish it from other causes of a high platelet count.
- Outline the main clinical and laboratory features of primary myelofibrosis.
- **Medical Emergencies in Haematology**
The student should be able to:
 - Recognise medical emergencies in haematology including neutropenic sepsis, spinal cord compression, superior vena cava obstruction, thrombotic thrombocytopenic purpura, recent onset of a bleeding disorder and hypercalcaemia.