

Hematology Rotation Clerkship Objectives

1. Anemia

Given a patient with anemia, the student will be able to:

- List the differential diagnosis for anemia based on red blood cell size (microcytic, normocytic, macrocytic)
 - Including iron deficiency, hemoglobinopathies, anemia of chronic disease, vitamin B12 deficiency, folate deficiency, hemolysis and bone marrow failure.
- Take a focused history for the symptoms, complications and underlying causes of anemia
- Perform a physical examination for the signs and underlying causes of anemia
- Justify the tests ordered to investigate anemia
- Interpret iron studies to differentiate between iron deficiency and anemia of chronic disease
- List the CBC findings and associated complications seen in bone marrow failure
 - Anemia, thrombocytopenia (bleeding), neutropenia (infection)
- Develop a treatment plan for the following disorders
 - Iron deficiency, hemoglobinopathies, anemia of chronic disease, vitamin B12 deficiency, folate deficiency, hemolysis, and bone marrow failure including aplastic anemia
- Discuss when and how to order a red blood cell transfusion in a patient with anemia
- Recognize and develop a management plan for a patient with a blood transfusion reaction

2. Bleeding and bruising

Given a patient who has a bleeding or bruising tendency, the student will be able to:

- List the differential diagnosis for excess bleeding/bruising based on an anatomical cause, primary hemostasis, secondary hemostasis or fibrinolytic problems
 - Including platelet function defects (quantitative versus qualitative; congenital versus acquired), connective tissue defects, von Willebrand disease, Hemophilia A and B (congenital versus acquired), liver disease and DIC
- List the differential diagnosis for thrombocytopenia
- Take a focused history using a Bleeding Assessment Tool to screen for an underlying bleeding disorder
- Describe how the clinical manifestations of primary hemostasis differ from secondary hemostasis defects
- Perform a physical examination for signs of recent bleeding/bruising
 - Explain the difference between ecchymoses and petechiae and the medical conditions in which you may see these findings
- Justify the tests ordered to investigate for excess bleeding/bruising

- Interpret the following tests and the causes in a patient who is bleeding/bruising:
 - Isolated prolonged aPTT
 - Isolated prolonged PT/INR
 - Prolonged aPTT and PT/INR
 - Low fibrinogen
 - Normal aPTT, PT/INR, and fibrinogen
- Describe a mixing study and how it is helpful when investigating an abnormal aPTT
- Explain what is a lupus inhibitor and how it affects the aPTT
- Differentiate the clinical presentation, physical examination and laboratory findings between ITP, TTP and DIC
- Develop a management plan for the following disorders
 - von Willebrand disease, Hemophilia A and B, ITP, TTP, and DIC

3. Venous thromboembolism

Given a patient with a venous thromboembolism (VTE) including deep vein thrombosis (DVT) or pulmonary embolism (PE), the student will be able to:

- List major provoking risk factors that predispose to venous thromboembolism
 - Recent surgery, immobility, malignancy, exogenous estrogen or pregnancy
- Take a focused history for the symptoms, complications and risk factors of VTE (DVT/PE)
- Perform a physical examination for the signs and complications of DVT and PE
- Summarize a clinical decision rule (e.g. Wells' Criteria) to guide D-dimer testing and imaging investigations
- Interpret ultrasound imaging findings to distinguish a proximal DVT, distal DVT and a superficial vein thrombosis
- Discuss the indications for thrombophilia testing
- Develop a treatment plan for VTE based on underlying risk factors (provoked versus unprovoked) and a patient's co-morbidities
- Describe features of a DVT or PE presentation that require systemic thrombolysis
- List the indications for an IVC filter
- Recognize the features of post-thrombotic syndrome and chronic thromboembolic pulmonary hypertension

4. Splenomegaly

Given a patient with splenomegaly, the student will be able to:

- List the differential diagnosis for splenomegaly
 - Including causes of congestion, hemolysis, infiltrative (malignant versus non-malignant), infectious and inflammatory
- Take a focused history for the symptoms and underlying causes of splenomegaly
- Perform a physical examination for splenomegaly

- Justify the tests ordered to investigate the causes of splenomegaly
- Develop a management plan for the following disorders
 - Hemolytic anemia
- List the potential complications of splenectomy and preventative strategies to address these complications

5. Polycythemia

Given a patient with polycythemia, the student will be able to:

- List the differential diagnosis for polycythemia based on relative, primary and secondary causes
 - Smoking, cardiac, respiratory, renal, familial causes and polycythemia vera
- Take a focused history for the symptoms, complications and underlying causes of polycythemia
- Perform a physical examination for the signs, complications and underlying causes of polycythemia
- Justify and interpret the tests to investigate for polycythemia
 - Explain the role of erythropoietin in differentiating a primary versus secondary cause of polycythemia
- List two complications of polycythemia vera
- Develop a management plan for the following disorders
 - Polycythemia vera, secondary causes of polycythemia

6. Thrombocytosis

Given a patient with thrombocytosis, the student will be able to:

- List three causes of reactive (secondary) thrombocytosis
- Define primary thrombocytosis and explain the pathophysiology of essential thrombocythemia (ET)
- List two complications of essential thrombocythemia

7. Fever in the immunocompromised host

Given an immunocompromised patient who has a fever, the student will be able to:

- Define febrile neutropenia
- Describe the patterns of clinical presentation for different types of immunodeficiencies
 - Neutropenia, asplenia/hyposplenism, complement deficiencies, B-cell defects, T-cell defects
- Take a focused history for the type and source of infection
- Perform a physical examination for the type and source of infection
- Justify tests ordered to investigate for the type and source of infection:
- Develop an initial management plan for a patient with febrile neutropenia

8. Abnormal white blood cells

Given a patient with a white blood cell abnormality, the student will be able to:

- List the differential diagnosis for a white blood cell abnormality based on non-malignant and malignant causes for:
 - Neutrophilia, lymphocytosis

- Differentiate the clinical presentation, physical examination and laboratory findings between AML, ALL, CML and CLL
- Explain when a bone marrow aspirate and biopsy would be indicated to investigate a white blood cell abnormality
- Explain when peripheral blood flow cytometry would be indicated to investigate a white blood cell abnormality
- Identify clinical presentations that require urgent diagnosis and treatment
 - AML, ALL, febrile neutropenia
- Discuss the general treatment principles of AML, ALL, CML and CLL

9. Lymphadenopathy

Given a patient with lymphadenopathy, the student will be able to:

- List the differential diagnosis for lymphadenopathy based on reactive and malignant causes
 - Infectious, inflammatory and malignant (Hodgkin lymphoma, non-Hodgkin lymphomas, CLL, metastatic cancer)
- Take a focused history for the symptoms and underlying causes of lymphadenopathy
- Perform a physical examination to differentiate reactive versus malignant causes of lymphadenopathy
- Justify the tests ordered to investigate lymphadenopathy
- Describe the type of lymph node biopsy required to adequately diagnosis lymphoma