Unit 7: Hematology
Chapter 33 & 34
ONLINE CONTENT (2H)

Complete the worksheet and submit in the Unit 7: Hematology dropbox by March 17, 2025 at 0800. Please be sure to bring a copy to class on March 17, 2025.

Table 1	**Iron Deficiency Anemia**	**Thalassemia**	**Cobalamin (Vitamin B_{12}) Deficiency**	**Folic Acid Deficiency**
Etiology	• Inadequate diet intake • Malabsorption • Blood loss (GI: peptic ulcer, gastritis, esophagitis, diverticula, hemorrhoids, and cancer) (GU: menstrual bleeding) • Hemolysis • A need for higher iron needs (Menstruating or pregnant women)	• Inadequate production of normal hgb • Due to an absent or reduced globulin protein • Commonly found in people of ethnic origins near the Mediterranean Sea and equator	• Chronic alcohol use • Diet deficiency • Deficiency of gastric intrinsic factor o Celiac disease o Gastrectomy o Gastric bypass o H. pylori o Pernicious anemia • Increased requirement (Pregnancy) • Intestinal malabsorption	• Chronic alcohol use • Chronic hemodialysis (folic acid lost during dialysis) • Diet deficiency • Drugs interfering with absorption or use of folic acid • Increased requirement (pregnancy) • Malabsorption syndrome o Celiac disease o Crohn disease o Small bowel resection
Clinical Manifestations	• May have no symptoms • Pallor • Glossitis (inflammation of the tongue) • Cheilitis (inflammation of the lips) • Headache • Parasthesias • Burning sensation of the tongue	• Often asymptomatic • Mild to moderate anemia with microcytosis and hypochromia • Mild splenomegaly • Bronzed skin color • Bone marrow hyperplasia • Pale • General anemia symptoms • Jaundice • Hepatomegaly and cardiomyopathy from iron deposition • Cardiac complications (iron	• GI (sore, red, beefy, and shiny tongue; anorexia, nausea, and vomiting; and abdominal pain) • Weakness • Paresthesia of the feet and hands • Reduced vibratory and position senses • Ataxia • Muscle weakness • Impaired cognition	• Develops insidiously • May be attributed to coexisting problems (cirrhosis, esophageal varices) • GI problems (stomatitis, cheilosis, dysphagia, flatulence, and diarrhea) • Thiamine deficiency

		overload, lung disease, HTN) • Endocrine problems (diabetes, growth retardation, hypogonadism) • Osteoporosis • Pulmonary HTN • Thrombosis		
Diagnostic Studies	• Endoscopy • Colonoscopy • Bone marrow biopsy if other tests are inconclusive • Hgb and Hct • Serum iron, ferritin, transferrin • Occult blood test • Total iron-binding capacity (TIBC) • Reticulocyte count • RBC count with morphology	• Hgb/Hct • MCV • Reticulocytes • Serum iron • TIBC • Serum transferrin • Serum ferritin • Serum bilirubin • Serum b12 folate	• Hgb/Hct • MCV • Reticulocytes • Serum iron • TIBC • Serum transferrin • Serum ferritin • Serum bilirubin • Serum b12 folate • Serum methylmalonic acid (MMA)	• Serum folate • Hgb and Hct • Serum iron, ferritin, transferrin • Total iron-binding capacity (TIBC) • Reticulocyte count • Serum b12 • MCV
Drug Therapy	• Oral iron supplementation (ferrous sulfate or gluconate) • IM or IV iron supplementation (iron dextran, sodium ferrous gluconate, iron sucrose)	• Blood transfusion or exchange transfusions in conjunction with chelating agents that bind to iron • Oral deferasirox or deferiprone • IV or subcutaneous deferoxamine	• Parenteral vitamin b12 (cyanocobalamin, hydroxocobalamin) • Intranasal cyanocobalamin (Nascobal)	• Folic acid replacement therapy
Nursing Management	• Identify and treat underlying cause • Drug therapy • Nutrition therapy • Packed RBC transfusion	• Patient may require a splenectomy • Monitor liver, heart, and lung function and provide treatment as needed. • Hematopoietic stem cell transplantation is the only cure for thalassemia	• Assess for neurological problems that are not corrected by replacement therapy • Implement measures to reduce the risk for injury from the decreased sensitivity to heat and pain. • Protect the patient from falling, burns, and trauma	• Nutrition therapy (eat foods high in folic acid

Table 2	Anemia of Chronic Disease	Aplastic Anemia	Acute Anemia due to Blood Loss	Chronic Anemia due to Blood Loss
Etiology	• Cancer • autoimmune and infectious disorders like HIV, hepatitis and malaria. • Heart failure. • Chronic inflammation. • Bleeding episodes can contribute to anemia of chronic disease	• Chemical agents and toxins • Drugs • Immune suppression of stem cells by autoreactive T lymphocytes. • Inherited stem cell defect. • Radiation. • Toxic injury to bone marrow stem cells. • Viral and bacterial infections.	• Trauma • Surgery complications. • Problems that disrupt vascular integrity.	• Similar to those of iron deficiency anemia
Clinical Manifestations	• similar to other anemias	• Fatigue • Dyspnea • Palpitations. • Exertional dyspnea. • Bounding pulse. • Roaring in the ears.	• 1000 milliliter volume loss: detectable signs or symptoms at rest. Increased heart rate with exercise and slight postural hypotension. • 1500 milliliters volume loss: Normal supine blood pressure and pulse at rest. Postural hypotension and increased heart rate with exercise. • 2000 milliliter volume loss: Blood pressure, central venous pressure, and cardiac output below normal at rest; Air hunger; rapid, thready pulse and cold, clammy skin. • 2500 milliliter volume loss: Shock, lactic acidosis, and potential death.	• Similar to that of iron deficiency anemia
Diagnostic Studies	• Hgb/Hct • MCV • Reticulocytes • Serum iron	• Hgb/Hct • MCV • Reticulocytes • Serum iron	• the signs and symptoms the patient has are more important than the laboratory values • When blood volume loss is	• Similar to that of iron deficiency anemia

	• TIBC • Serum transferrin • Serum ferritin • Serum bilirubin • Serum b12 folate	• TIBC • Serum transferrin • Serum ferritin • Serum bilirubin • Serum b12 folate	sudden, plasma volume has not yet had a chance to increase. lab data does not reflect the red blood cell loss • Some values may seem normal or high for two to three days. However, once the plasma volume is replaced, the RBC mass is less concentrated. Then RBC, HGB and HCT levels are low and reflect the actual blood loss.	
Drug Therapy	• EPO therapy is used for anemia from renal disease and cancer and its therapies. • Blood transfusions are not recommended for long term treatment.	• immunosuppressive therapy with anti-thymocyte globulin and cyclosporin • eltrombopag	• if a large volume of blood is lost whole blood platelets plasma and cryoprecipitate may be given because large volumes of RBC's dilute the coagulation system • Volume fluid replacement. • Iron replacements.	• Iron supplements
Nursing Management	• correct the underlying problem • If the anemia is severe blood transfusions may be needed	• identify and remove the causative agent if possible and provide support care until pancytopenia resolves. • Nursing actions are aimed at preventing complications from infection and bleeding	• assess the patient for pain Internal bleeding may cause pain due to tissue distension, organ displacement, and nerve compression. • Pain may be localized or referred. • In the case of retroperitoneal bleeding, the patient may not have abdominal pain. Instead, there may be numbness in pain in a lower extremity from compression of the lateral cutaneous nerve. • The major complication is shock.	• Management of chronic blood loss anemia involves identifying the source and stopping the bleeding

Table 3	Acquired Hemolytic Anemia	Hemochromatosis	Polycythemia
Etiology	• results from hemolysis of RBCs from extrinsic factors These factors include physical destruction, antibody reactions, and infectious agents and toxins.	• the most common cause is a genetic defect. • May occur with diseases such as sideroblastic anemia and liver disease and the chronic blood transfusions used to treat Thalassemia and SCD.	• Primary polycythemia o Increased production of the red blood cells, white blood cells, and platelets. Which leads to enhanced blood viscosity and blood volume and congestion of organs and tissues with blood. • Secondary polycythemia o Hypoxia driven secondary polycythemia can be caused by high altitude cardiopulmonary disease and defective O2 transport. o Hypoxia, independent secondary polycythemia, can be caused by renal cysts or tumors and extra renal tumors.
Clinical Manifestations	• fatigue • Paleness. • Jaundice. • Dark urine. • Shortness of breath. • Splenomegaly. • Hepatomegaly	• symptoms usually do not develop until after the age of 40 in men and after the age of 50 in women • Early symptoms are nonspecific and include fatigue, arthralgia, impotence, abdominal pain, and weight loss. • Later, the excess iron accumulates in the liver and causes liver enlargement. And cirrhosis. • Excess iron deposits in the liver, pancreas, heart, joints and endocrine glands cause diabetes, skin pigment changes or bronzing, heart problems arthritis and testicular atrophy.	• Hypertension caused by hypervolemia and hyper viscosity • Common first manifestations include headache, Vertigo, dizziness, tinnitus and visual changes. • Generalized itching, which is often exacerbated by a hot bath, may be a striking symptom. • Paresthesia and erythromelalgia, which is painful burning and redness of the hands and feet may be present. • Patient may have angina, heart failure, intermittent claudication, and thrombophlebitis which may be complicated by embolization. • These manifestations can be caused by blood vessel distension, impaired blood flow, circulatory stasis, thrombosis, and tissue hypoxia from the hypervolemia and

			hyper viscosity.
Diagnostic Studies	• Hgb/Hct • MCV • Reticulocytes • Serum iron • TIBC • Serum transferrin • Serum ferritin • Serum bilirubin • Serum b12 folate	• High serum iron, TIBC, serum ferritin. • Testing for known genetic mutations to confirm the diagnosis. • MRI to measure liver and cardiac iron. • Liver biopsy to quantify the amount of iron and establish the degree of organ damage.	• The major diagnostic criteria for polycythemia Vera include high HGB HCT, and RBC mass; Bone marrow examination showing hypercellularity of RBC's, WBCs in platelets; and presence of JAK2 V617F or JAK2 exon 12 mutation. • Other studies show low EPO level. Secondary polycythemia has a high level. Hi, WBC count with basophilia and neutrophilia; high platelet counts and platelet dysfunction; and normal or high leukocyte alkaline phosphatase, uric acid, and cobalamin levels
Drug Therapy	• folate replacement • immunosuppressive agents like glucocorticoids. • For severe cases associated with hemolysis, thrombocytopenia, and acute kidney injury, additional immunosuppressants may be used. •	• iron chelating drugs may be used • Deferoxamine chelates and removes iron via the kidneys and is given IV or subcutaneously. • Deferasirox and deferiprone are oral drugs.	• Myelosuppressive agents such as hydroxyurea or busulfan may be given • Ruxolitinib, which inhibits expression of the JAK2 mutation, is given to those who do not respond to hydroxyurea, women of childbearing age. or those with intractable itching.
Nursing Management	• treatment and management involve general supportive care until the causative agent can be eliminated or at least made less injurious to the RBC's • Supportive care may include giving corticosteroids and blood products or removing the spleen.	• the goal of treatment is to remove excess iron from the body and minimize any symptoms the patient may have • Iron removals achieved by removing 500 milliliters of blood each week until the iron stores are depleted. Then blood is removed less often to maintain iron levels within normal limits. • Diet changes include avoiding vitamin C, iron supplements, uncooked seafood, and iron rich food.	• Treatment aims to reduce blood volume and viscosity in bone marrow activity. Phlebotomy is the mainstay of treatment. The aim of phlebotomy is to reduce the HCT and keep it less than 45% • Hydration therapy can reduce the blood's viscosity, and low dose aspirin can prevent clotting. • Assess intake and output during hydration therapy to avoid fluid overload or fluid deficit. • Give myelosuppressive agents as ordered. • I want to. Observe the patient and teach them about drug side effects. • Assess the patient's nutrition status.

			• Inadequate food intake can result from GI symptoms of fullness, pain and dyspepsia. • Begin activities and any drug therapy to decrease thrombus formation.

In order to receive full credit (2H class time) for this assignment, it must be completed in its entirety by the due date/time assigned. Any assignment not completed in its entirety by the due date and time will result in missed class time and must be completed by the end of the semester to pass the course.