chapter 16

The Hematologic System

evolve
http://evolve.elsevier.com/deWit/medsurg

Objectives

Theory

1. Describe the structures and functions of the hematologic system.
2. Differentiate between the various types of blood cells and their functions.
3. Discuss factors that may alter the function of the hematologic system.
4. Identify ways in which the nurse might help prevent blood disorders.
5. List at least five different kinds of information that can be obtained from a complete blood count (CBC).
6. Describe ways to accomplish hemostasis.
7. Apply the nursing process to patients with *problems* of the hematologic system.

Clinical Practice

1. Explain the procedure and care for a bone marrow aspiration to a patient about to undergo the procedure.
2. Perform a focused assessment on a patient with a problem of the hematologic system.
3. Choose nursing interventions for patients with problems of the hematologic system.

Key Terms

agranulocytosis (p. 335)
aplastic anemia (ā-plăs-tĭk ă-NĒ-mē-ă, p. 335)
dyscrasias (dĭs-KRĀ-zhē-ăz, p. 334)
erythropoiesis (ĕ-rĭth-rō-pō-Ē-sĭs, p. 332)
gingivitis (jĭn-jĭ-VĪ-tĭs, p. 339)
hemarthrosis (hē-măr-THRŌ-sĭs, p. 340)
hematocrit (hē-MĂT-ō-krĭt, p. 336)
hemolysis (hē-MŎL-ĭ-sĭs, p. 334)
iatrogenic (Ī-ă-trō-JĔN-ĭk, p. 334)
jaundice (JĂWN-dĭs, p. 339)
leukopenia (lū-kō-PĒ-nē-ă, p. 334)
melena (MĔL-ĕh-nă, p. 340)
petechiae (pĕ-TĒ-kē-ă, p. 339)
polycythemia (pŏl-ē-sī-THĒ-mē-ă, p. 339)
thrombocytopenia (thrŏm-bō-sīt-ō-PĒ-nē-ă, p. 335)

OVERVIEW OF ANATOMY AND PHYSIOLOGY OF THE HEMATOLOGIC SYSTEM

WHAT ARE THE FUNCTIONS OF BLOOD?

- Blood transports water, oxygen, nutrients, hormones, enzymes, and medications to the cells.
- Blood transports carbon dioxide and other waste products away from the cells.
- The 4 to 5 L of blood in the body help regulate fluid volume and electrolyte distribution.
- The blood regulates the pH and acid-base balance by its buffering ability.
- Blood assists in regulating body temperature.
- Blood provides clotting factors for hemostasis.

WHAT ARE THE COMPONENTS OF BLOOD?

- Blood is composed of formed elements and plasma (Figure 16-1).
- The formed elements are erythrocytes, neutrophils, lymphocytes, monocytes, eosinophils, basophils, and platelets.
- Plasma contains proteins, water, salts, dissolved gases (such as CO_2), bicarbonate (HCO_3^-), hormones, glucose, and wastes.
- The plasma proteins are albumin, globulins, and fibrinogen.

WHAT ARE THE FUNCTIONS OF THE PLASMA PROTEINS?

- Albumin raises osmotic pressure at the capillary membrane, preventing fluid from leaking out into the tissue spaces. (Osmotic pressure is covered in Chapter 3.)
- The alpha and beta globulins work as carriers for drugs and lipids by combining with them and transporting them throughout the body; gamma globulins act as antibodies.
- Fibrinogen is essential to the formation of blood clots.

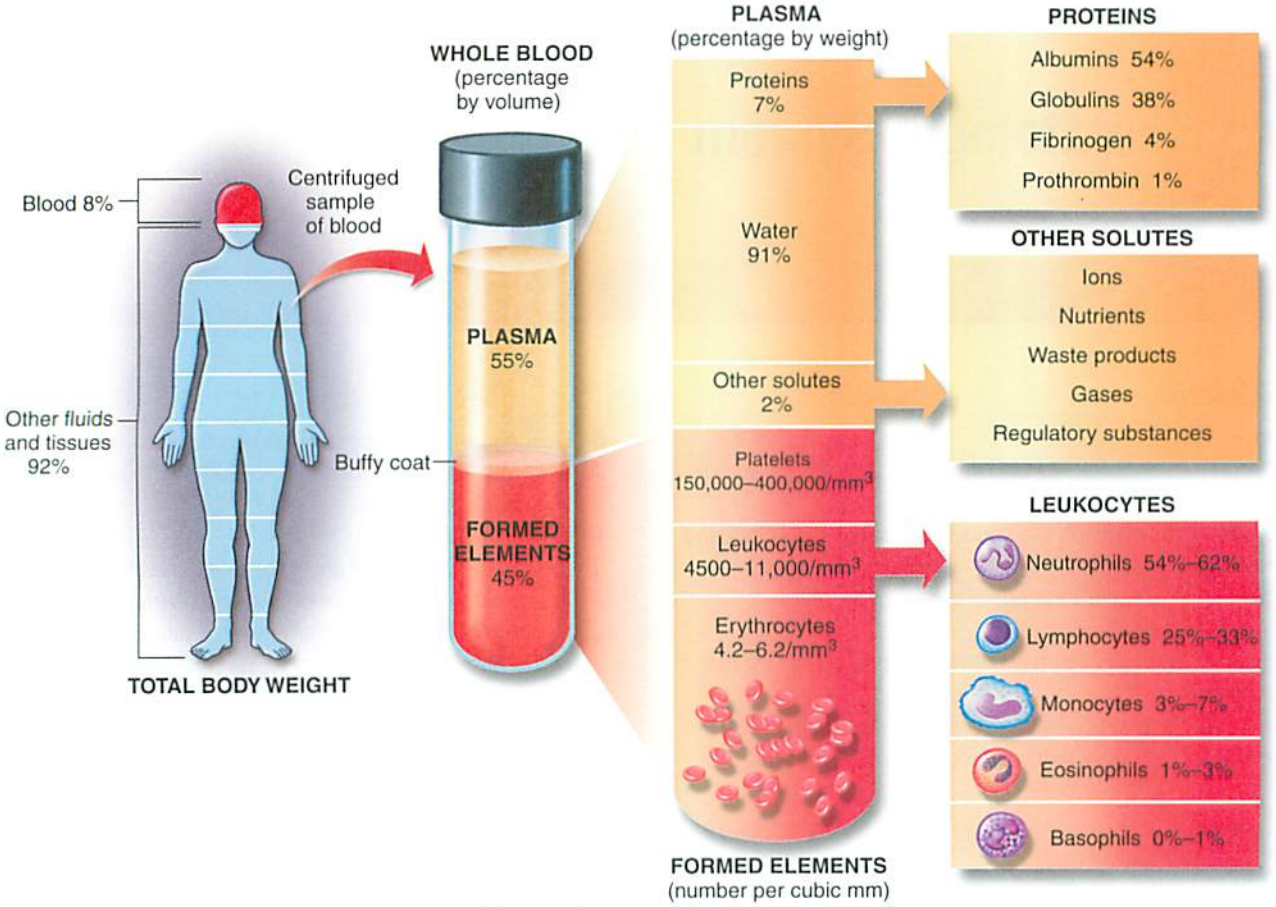

FIGURE 16-1 Components of blood.

HOW DOES THE BODY PRODUCE BLOOD CELLS?

- Blood cells develop from stem cells located in the bone marrow through **erythropoiesis** (Figure 16-2).
- The kidney makes most of the body's erythropoietin-stimulating factor, which then prompts the liver to release erythropoietin for erythrocyte production.
- Erythropoiesis needs iron, vitamins B_{12}, C, and E, folic acid, and amino acids—all of which are obtained from proteins.

WHAT ARE THE FUNCTIONS OF THE RED BLOOD CELLS?

- Red blood cells (RBCs or erythrocytes, the most numerous of the blood cells), contain hemoglobin, which carries oxygen to the cells and a portion of carbon dioxide away from the cells.
- Each person has a hereditary blood type based on the antigens on the RBCs.
- The normal range for adults for RBCs is 4.2 to 6.2 million/mm^3.
- The normal range for hemoglobin in adults is 12 to 18 g/dL.
- Decreased numbers of RBCs or decreased hemoglobin results in a reduction in the amount of oxygen that can be carried to the cells of the body.
- RBCs live for approximately 120 days.
- Old, damaged red cells are removed by the spleen and the liver.

WHAT ARE THE FUNCTIONS OF WHITE BLOOD CELLS?

- White blood cells (WBCs or leukocytes) provide the first line of defense against microbial agents.
- The normal adult range for total leukocytes (WBCs) is 4500 to 11,000/mm^3.
- Leukocytes are divided into granulocytes (meaning *with granules*) and agranulocytes (meaning *without granules*) in the cell nucleus (see Figure 16-2).
- Leukocytes migrate from the bone marrow cells out into the tissues, and are carried by the bloodstream to locations where they are needed.
- Granulocytes are divided into neutrophils, eosinophils, and basophils and are produced in the red bone marrow.
- Neutrophils make up 54% to 62% of the WBC count and work by engulfing and destroying bacteria by the process of *phagocytosis*.
- An infection in the body stimulates increased production of neutrophils, resulting in a higher-than-normal WBC count, or leukocytosis.

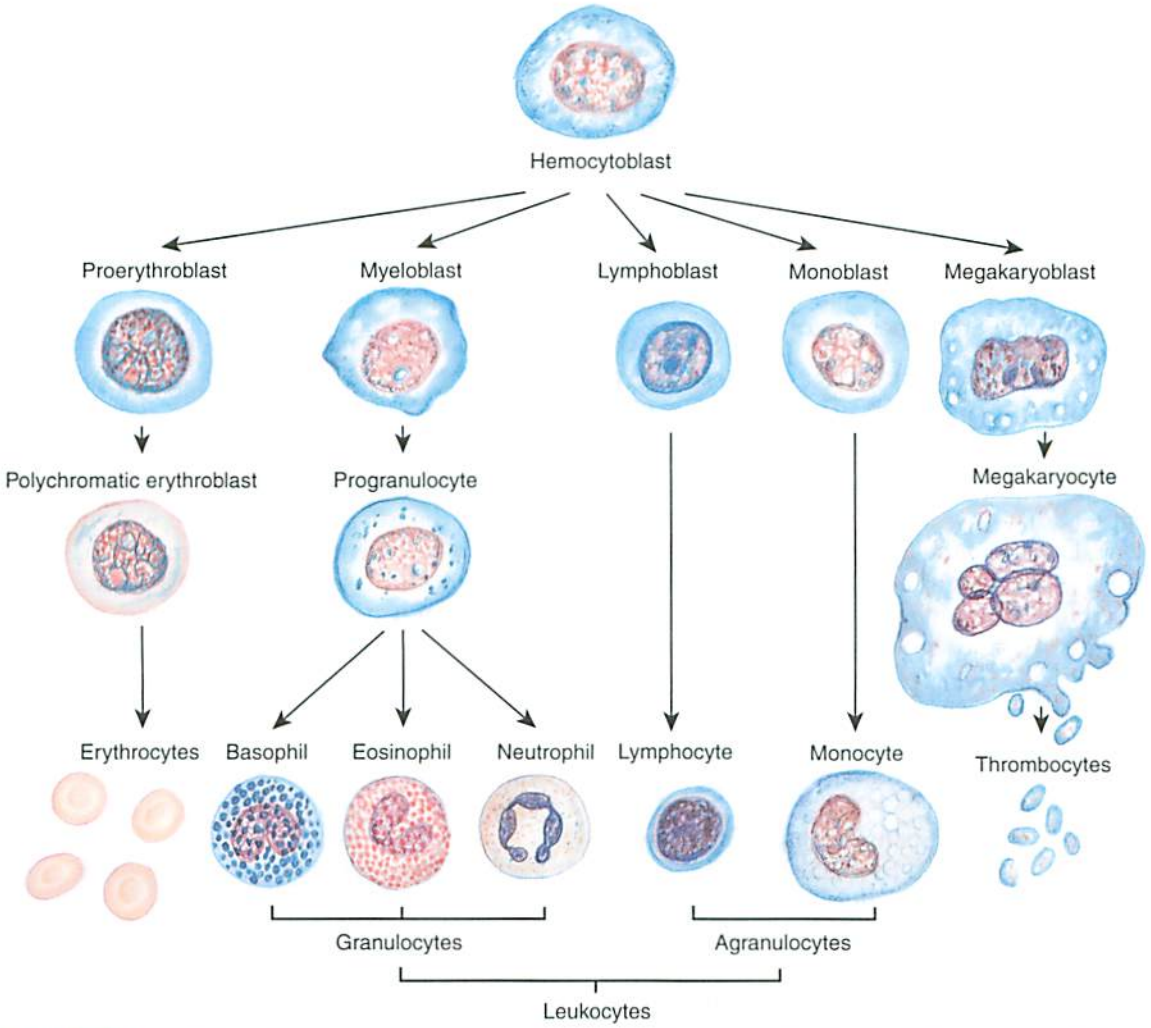

FIGURE 16-2 Erythrocytes (RBCs), leukocytes (WBCs), and thrombocytes (platelets) are the end products of erythropoiesis.

- Eosinophils, which make up 1% to 3% of the total WBCs, help detoxify foreign proteins; eosinophils increase in number during allergic reactions and in response to parasitic infections.
- Basophils, which comprise up to 1% of the total WBC count, release histamine in response to allergens and help prevent clotting in the small blood vessels.
- Agranulocytes consist of lymphocytes and monocytes.
- Agranulocytes are produced in the red bone marrow and in lymphatic tissue.
- Lymphocytes, which comprise 25% to 33% of WBCs, are produced in the red bone marrow and the lymphatic tissue. Lymphocytes occur as B cells and T cells. B lymphocytes change into plasma cells that produce immunoglobulins responsible for the humoral immune response.
- Some T cells are killer cells that fight antigens and provide cell-mediated immune response (see Chapter 10).
- Monocytes comprise 3% to 7% of the WBCs and become macrophages (large mononuclear monocytes) migrating out into the tissues where they become phagocytes, fighting infection and ridding the body of foreign substances. They engulf bacteria and foreign substances and eliminate them from the body.
- A differential blood cell count gives information about the numbers of different types of leukocytes present in the blood and about the type of inflammatory process that is occurring.

WHAT ARE PLATELETS AND WHAT IS THEIR FUNCTION?

- Platelets, also called *thrombocytes*, are fragments of megakaryocytes that are produced by the bone marrow.
- Platelets provide the first line of protection, after vasospasm (contraction of a vessel), to prevent bleeding by promoting clotting when the wall of a blood vessel has been damaged.
- Platelets are involved in maintaining hemostasis by a complex process that balances the production of the clotting and dissolving factors.
- Fibrin strands derived from the plasma protein fibrinogen attach to aggregated platelets to help form a clot.

- Platelets are small formed elements of the blood active in the clotting process. Platelets tend to adhere to damaged or uneven surfaces and to clump together.
- The normal adult platelet count range is 150,000 to 400,000/mm^3; the life span of a platelet is about 10 days.
- Although the body can withstand a substantial drop in the number of platelets, when the platelet count is low, there is risk of spontaneous bleeding into the skin, kidney, brain, and other internal organs.

HOW DOES THE LYMPHATIC SYSTEM INTERACT WITH THE VASCULAR SYSTEM?

- The lymphatic system consists of lymph nodes, lymph channels, the spleen, and the thymus gland (see Chapter 10).
- The spleen, located in the upper left abdominal cavity below the diaphragm and behind the stomach, filters the blood, removing pathogens, old blood cells, and debris, and produces lymphocytes (see Figure 10-2).
- The spleen is a reservoir for extra blood; in response to hemorrhage, it contracts, and by contraction, the spleen releases some of its stored blood into the cardiovascular system.
- If the spleen is removed, its functions are taken over by other lymph tissue and by the liver.
- Lymph vessels collect excess fluid and protein from the interstitial spaces and return it to the bloodstream.
- Lymph nodes (bundles of lymphatic tissue) filter out leukocytes and cell debris from inflammations and infections before the lymph is returned to the bloodstream.

WHAT CHANGES OF THE HEMATOLOGIC SYSTEM OCCUR WITH AGING?

- Plasma volume decreases after age 60; the older person has less blood volume. This means less blood reserve in case of blood loss.
- Bone marrow activity decreases by about 50% as years advance; the marrow becomes infiltrated with fat and fibrotic tissue. Reduced bone marrow inhibits full production of blood cells, so the immune response is decreased, making the older person more susceptible to infection. There is less antibody response to foreign proteins.
- New cells are produced at a slower rate, and correction of anemia becomes a longer process.
- Antibody response to vaccines is decreased.
- When blood loss occurs, the elderly patient is at greater risk for hypovolemia and shock.
- Blood is more prone to coagulate, because platelets tend to aggregate more with advancing age, and there are alterations in clotting activity. The increased incidence of thrombosis in coronary and cerebral arteries may be related to changes in clotting activity. Daily low-dose aspirin sometimes is prescribed to counteract this phenomenon.
- There is progressive loss of body hair on extremities, which makes the use of this finding for a hematologic disorder unreliable in the elderly.
- Pigment loss and yellowish cast to the skin are common changes associated with aging; these routine skin changes make pallor and jaundice more difficult to discern in the elderly.

CAUSES OF HEMATOLOGIC DISORDERS

Hematology is the study of blood and blood-forming tissues. The lymphatic system, which drains the fluid from the spaces around each cell and channels it into the circulatory system, is discussed in Chapter 10. Several disorders that interfere with normal function of the blood are inherited. Hemophilia, sickle cell disease, and thalassemia types of anemias are examples. Accidental tearing or cutting of the vessels of the cardiovascular system and surgery cause bleeding and loss of blood. Blunt trauma to the spleen, such as might occur in an automobile accident, may cause tearing and massive internal hemorrhage. Chemicals and transfusions of the wrong blood type can cause **hemolysis** (destruction of red blood cells).

Cultural Considerations

Genetic Hematologic Tendencies

- African Americans have the highest incidence of sickle cell disease.
- Pernicious anemia is more prevalent among those of Scandinavian descent and among African Americans.
- People of Middle-Eastern origin may have a genetic predisposition to thalassemia.

Some blood disorders are **iatrogenic;** that is, they are brought on by medical treatment. For example, blood **dyscrasias** (imbalance in numbers of types of cells) or other pathologic conditions of the blood can be induced through at least four kinds of actions:

- Bone marrow suppression, which interferes with the production of blood cells
- Interference with normal cell function
- Destruction of the blood cells by cytotoxic drugs
- Destruction of cells by a transfusion reaction of mismatched blood

Some antineoplastic drugs, for instance, act to depress the bone marrow, which inevitably causes a reduced supply of blood cells. Other drugs, such as phenytoin (Dilantin), primidone (Mysoline), and oral contraceptives, can produce anemia by interfering with the absorption and utilization of folic acid, a substance needed to produce RBCs. Diuretics such as furosemide (Lasix) and hydrochlorothiazide (Hydro-DIURIL) sometimes cause **leukopenia** (decreased

numbers of white cells), **aplastic anemia** (deficient cell production due to a bone marrow disorder), and abnormally low counts of platelets and granulocytes. Procainamide hydrochloride (Pronestyl) and quinidine, which are used to correct dysrhythmias of the heart, also can cause **thrombocytopenia** (too few platelets), **agranulocytosis** (decrease in granulocyte production), and aplastic anemia. Most drugs are powerful chemicals that are capable of producing undesirable side effects, even though the drugs can be of great value.

Clinical Cues

If the patient is showing signs of a blood disorder, review the medications that are being taken, and note their side effects.

Nutritional deficiencies, such as low protein or lack of vitamin C, can interfere with erythropoiesis and normally functioning blood cells. Abnormal red cells are more prone to rapid destruction, which can result in anemia. Bone marrow damage from toxic substances may also interfere with the production of blood cells. Malignant conditions such as leukemia cause growth of abnormal blood cells and interfere with the production of normal cells. Box 16-1 presents factors that alter hematologic system function.

Nutrition Considerations

Nutrients Needed for Building Red Blood Cells (Erythropoiesis)

NUTRIENT	ROLE IN ERYTHROPOIESIS	FOOD SOURCES
Cobalamin (vitamin B_{12})	RBC maturation	Red meats, especially liver
Folic acid	RBC maturation	Green leafy vegetables, liver, meat, fish, legumes, whole grains
Iron	Hemoglobin synthesis	Liver and muscle meats, eggs, dried fruits, legumes, dark green leafy vegetables, whole-grain and enriched bread and cereals, potatoes
Vitamin B_6	Hemoglobin synthesis	Meats (especially pork and liver), wheat germ, legumes, potatoes, cornmeal, bananas
Amino acids	Synthesis of nucleoprotein	Eggs, meat, milk and milk products (cheese, ice cream), poultry, fish, legumes, nuts
Vitamin C	Conversion of folic acid to its active forms; aids in iron absorption	Citrus fruits, leafy green vegetables, strawberries, cantaloupe

RBC, red blood cell.

Box 16-1 Factors that May Alter Function of the Hematologic System

GENETIC DISORDERS
- Hemophilia
- Sickle cell disease
- Agranulocytosis
- Fanconi syndrome

HEMORRHAGE (ANEMIA)
- Surgical blood loss
- Blood loss from childbirth or spontaneous abortion
- Traumatic blood loss

ANEMIA
- Iron deficiency
- Folic acid deficiency
- Pernicious anemia
- Chronic slow blood loss
- Aplastic anemia

HEMOLYSIS
- Blood transfusion reaction
- Genetic types of anemia

BONE MARROW SUPPRESSION
- Antineoplastic agents used in treatment of cancer
- Radiation treatment used for cancer
- Excessive exposure to ionizing radiation
- Exposure to toxic chemicals that damage bone marrow
- Drugs that suppress the bone marrow

BONE MARROW PROLIFERATION OR ABNORMALITY
- Leukemia

PREVENTION OF HEMATOLOGIC DISORDERS

When considerable blood is lost through hemorrhage, the patient becomes anemic. Sometimes excessive blood loss can occur during menstruation. Prevent hemorrhage after surgery or childbirth by vigilantly assessing the amount of blood loss and by instituting measures to stop the loss if it is excessive.

Clinical Cues

The average amount of blood loss via menstruation is less than 80 mL. A better way to estimate that blood loss is to count the number of saturated pads or tampons. Each saturated pad is equal to about 50 mL of blood loss.

The nurse can help prevent anemia by promoting proper nutrition and by educating the public about the possibility of nutritional anemia. Nutritional anemia is a particular concern for individuals who subsist mostly on "fast food."

Elder Care Points

An elderly person, especially one who lives alone, is at high risk of poor nutrition. Problems with arthritis, vision, and chronic diseases make it more difficult for the elderly to shop for food and to prepare food. As a result, an elderly person may substitute cookies, toast, or cereal for a well-balanced meal. It is important to obtain a food intake history.

Secretion of intrinsic factor from the stomach and absorption of vitamin B_{12} is decreased in the elderly. The lack of these substances can lead to pernicious anemia from B_{12} deficiency (see Chapter 17).

Monitoring patients for drug side effects, and alerting the physician should blood-related side effects occur, can prevent a serious blood disorder from developing. Carefully monitoring blood transfusions and promptly reporting any untoward reaction may decrease the incidence of hemolysis from a reaction.

Health Promotion

Preventing Blood Disorders

- Caution the public about the dangers of exposure to ionizing radiation and harmful chemicals, in order to help decrease the incidence of blood disorders related to harmful substances.
- Suggest genetic counseling (for the possibility of transmitting a genetic blood disorder to offspring) to those adults who have such a genetic disorder.
- Inform patients about medications they are taking that can cause blood disorders; remind patients to be alert for signs of excessive bruising or easy bleeding. Suggest that CBCs be checked periodically, for monitoring purposes.

DIAGNOSTIC TESTS AND PROCEDURES

A surprising amount of information can be obtained from a stained blood film using only a 5-mL sample of uncoagulated blood. Each of the formed elements can be studied for shape, maturity, and number. Other kinds of studies include those done to measure the rate at which RBCs settle out from plasma (called the *sedimentation rate*) and to separate and classify various kinds of proteins, including antibodies, in the plasma. Explain the venipuncture procedure and the purpose of the test to the patient. Many patients have a great fear of needles. Others are concerned about having what seems like a lot of blood withdrawn. A few words of assurance and explanation can do much to relieve anxiety about a needle stick and to promote cooperation. Use Standard Precautions and aseptic technique for the venipuncture, and the correct tubes for each sample. Wear latex or impermeable gloves any time a venipuncture is performed, and dispose of phlebotomy equipment according to Standard Precautions (see Appendix B).

Think Critically

The CBC of your patient shows the following values:

- RBCs: 4.8 million/mm^3
- WBCs: 6.7 million/mm^3
- Hemoglobin: 10.2 g/dL
- Platelets: 250,000/mm^3

What abnormalities, if any, do these results indicate?

Leukocyte counts provide information about infection and possible immune disorders (see Chapter 12). Data about the number of platelets are valuable in diagnosing a variety of diseases affecting—or affected by—the clotting of blood. There are at least 12 different types of hemoglobin in human blood. The types are designated by letters—for example, hemoglobin A is normal adult hemoglobin, hemoglobin F is normal fetal hemoglobin, and hemoglobin S is found in sickle cell disease. A **hematocrit** is a test that measures the volume of blood cells in relation to the volume of plasma. When there has been a loss of body fluids but no loss of cells (as in dehydration), the cell volume is high in proportion to the amount of liquid (plasma) in the bloodstream (i.e., the hematocrit rises). When either hemorrhage or anemia has depleted the supply of cells, the blood is "thinned" and the cell volume is low. Table 16-1 presents the most common diagnostic tests and related nursing care for the hematologic and lymphatic systems.

Clinical Cues

- Increased numbers of eosinophils often indicate allergy.
- A viral infection prompts the production of additional lymphocytes.
- Bacterial infection stimulates the production of neutrophils, and segmented neutrophils (segs) increase.
- Ongoing bacterial infections cause immature neutrophils to appear in the blood as *bands* (immature forms of segmented granulocytes). This is referred to as a "shift to the left."
- A "shift to the right" occurs when there are more mature neutrophils than usual; this occurs with anemia from vitamin B_{12} or folic acid deficiency.

NURSING MANAGEMENT

Assessment (Data Collection)

History

The nurse assesses patients for signs and symptoms that indicate abnormalities in the blood. Abnormal symptoms result from too little circulating blood or too little hemoglobin, too few platelets, deficiency of normal neutrophils or lymphocytes, and too many abnormal blood cells. **When there is insufficient hemoglobin to carry oxygen to the cells, signs of oxygen deficit occur.** Perform a focused assessment to obtain an appropriate history. Inquire about renal disease as this may be a cause of anemia.

Table 16-1 Diagnostic Tests for Disorders of the Hematologic System

TEST AND NORMAL RANGE	PURPOSE	DESCRIPTION	NURSING IMPLICATIONS
Complete blood count (CBC)	Determine whether abnormalities are present in the numbers of blood cells or types of blood cells; assess the amount of hemoglobin present. Useful to diagnose anemia.	Fill a lavender-top tube containing EDTA with a venous sample of blood. Use a site where there is little chance of dilution from intravenous solution. Mix the blood and the EDTA by gently rotating the tube.	Warn the patient that a "stick" is about to occur, but that the pain will be short-lived. Apply pressure directly to the puncture site after withdrawing the needle; at the antecubital space, do *not* have the patient flex the arm as this tends to cause a hematoma.
Erythrocytes			
Hemoglobin: females: 12.0-16.7 g/dL; males: 13.0-18.0 g/dL Red blood cell (RBC) count: females: 4.2-5.4 million/mm^3; males: 4.6-6.2 million/mm^3 Hematocrit: females: 37%-47%; males: 40%-54%			
Leukocytes			
White blood cell (WBC) count: 4500-11,000/mm^3			
Differential Count			
Granulocytes Neutrophils: 54%-62% of WBCs Eosinophils: 1%-3% of WBCs Basophils: 0%-1% of WBCs Agranulocytes Lymphocytes: 25%-33% of WBCs Monocytes: 3%-7% of WBCs Thrombocytes (platelets): 150,000-400,000/mm^3 of blood Mean corpuscular hemoglobin (Hb) (MCH): 26-34 pg/cell Mean corpuscular Hb concentration (MCHC): 32-36 g/dL Mean corpuscular volume (MCV): 80-96 μm^3			
Erythrocyte Sedimentation Rate (ESR)			
Wintrobe: Males: 0.5 mm/hr Females: 0-15 mm/hr Westergren: Males: 0-15 mm/hr Females: 0-20 mm/hr	To detect inflammation and infection.	Fill a blue-top tube with venous blood. The laboratory determines the rate at which the RBCs settle.	Explain that this test helps diagnose an inflammatory process but is nonspecific.
Hemoglobin Electrophoresis			
Hemoglobin A_{1c}: 3%-5% Hemoglobin A_2: 1.5%-3% Hemoglobin F: <1% of total	Useful in diagnosing various types of anemia. Useful for diagnosis and monitoring of diabetes mellitus.	Performed on venous sample using lavender-top tube with EDTA.	Same as for CBC.
Tests for Anemia			
Ferritin, serum: 20-200 ng/mL Total iron-binding capacity: 250-410 mcg/dL Saturation 20%-55%	Detect reason for anemia.	Obtain a venous blood sample of 5-7 mL in a red-top tube.	Same as for CBC.

Note: Normal values differ between laboratories.

Continued

Table 16-1 Diagnostic Tests for Disorders of the Hematologic System—cont'd

TEST AND NORMAL RANGE	PURPOSE	DESCRIPTION	NURSING IMPLICATIONS
Coagulation Tests			
Prothrombin time (PT): 12-14 sec Activated partial thromboplastin time (APTT): 20-25 sec Bleeding time, Ivy: 2.75-8.0 min	Determine abnormalities of clotting time.	Performed on a venous blood sample; use a blue-top tube.	Same as for a CBC; pressure may need to be applied longer than usual if the patient has an abnormal clotting time or is on heparin or warfarin therapy.
D-Dimer			
Negative: <0.5 mcg/mL	Blood test that provides assay of fibrin degradation to assess thrombin and plasmin activity. Useful for diagnosing pulmonary embolism and disseminated intravascular coagulation (DIC).	Collect blood sample in a blue-top tube.	No fasting is required.
Sickledex			
0	Tests for the presence of hemoglobin S.	Performed on a venous blood sample; use a lavender-top tube.	Client may be anxious about the result; be sensitive to patient emotions. Positive result indicates need for genetic counseling.
Bence-Jones Protein Test			
Presence of Bence-Jones proteins in the urine is abnormal	Assists in the diagnosis of multiple myeloma.	Obtain a 10-mL fresh morning specimen of urine in a clean container. Must be refrigerated or tested immediately.	Explain the procedure to the patient.
Schilling Test			
≥7% excreted within 24 hr	Determines ability to absorb vitamin B_{12}; used to diagnose pernicious anemia.	Radioactive B_{12} is given orally, followed in 2 hr by an intramuscular injection of B_{12}. A 24-hr urine specimen is collected.	Assess kidney function. Requires an 8- to 12-hr fast. No B vitamins for 3 days prior; no laxatives for 24 hr. Subnormal levels of B_{12} in the urine indicate the lack of intrinsic factor, which facilitates absorption of vitamin B_{12}.
Bone Marrow Aspiration and Biopsy			
Normal cell counts	Helps diagnose blood disorders.	Cells are withdrawn by needle from the sternum or iliac crest. Leukocytes, platelets, and erythrocytes are examined in the various stages of development to determine abnormalities. Assist in identifying certain anemias, leukemia, and thrombocytopenia.	Explain that the aspiration is done at the bedside. Seek an order for prebiopsy medication to decrease the discomfort. Explain that there is a feeling of pressure when the needle is inserted and sharp, brief pain when the marrow is aspirated. The area of aspiration is surgically prepped. The patient must hold perfectly still. Pressure is applied to the site afterward to prevent hematoma formation. Post-test, observe for swelling and tenderness, indicating continued bleeding or infection.

Focused Assessment

Data Collection for the Hematologic System

HISTORY TAKING

Ask the patient the following questions:

- Do you or anyone in your family have a genetic blood disorder (hemophilia, thalassemia, sickle cell trait or disease, aplastic anemia, agranulocytosis, or thrombocytopenic purpura)?
- What is your occupation?
- Have you ever been told you had anemia?
- Do you become easily fatigued?
- Do you have frequent sore throats or other infections?
- Do you frequently feel as though you have a fever?
- Do you ever have night sweats?
- Are your joints painful? Do they swell?
- Do you bruise easily or develop pinpoint blood spots?
- Do you suffer from itching?
- Do you have any swollen lymph nodes in the groin or armpits?
- Do you ever have tingling or numbness in the extremities?
- Do you have frequent headaches? Palpitations?
- Have you become more irritable than usual?
- Do you get dizzy frequently? Do you suffer fainting spells?
- Do you get short of breath when you walk a short distance or when you climb stairs?
- Do your gums bleed when you brush your teeth? Does your tongue get sore? Do you have frequent mouth sores?
- Do you have any difficulty eating?
- How much alcohol do you drink in a day?
- Do colds or infections seem to last a long time for you?
- Do you often feel fatigued even when not doing much?
- Have you been exposed to chemicals, such as pesticides, cleaning agents, or industrial chemicals of any kind?
- Have you ever noticed that you have black, tarry-looking stool? Smoky or brown urine?
- Do you have stomach pain or indigestion or ever had an ulcer?
- Are your menstrual periods unusually heavy?
- What do you usually eat for each meal?
- Are you often cold when others are not?
- Are there cultural factors you would like considered?
- What are your expectations of treatment?

PHYSICAL ASSESSMENT

Head and Neck

- Color of conjunctiva and sclera of eye
- Condition of gums, oral mucous membranes, and tongue
- Presence of enlarged cervical lymph nodes

Skin

- Color (pale) (check conjunctivae, palms of hands, and roof of the mouth in people with dark skin)
- Condition of fingernails (brittle, spoon-shaped)
- Presence of ecchymoses or petechiae
- Jaundice
- Nasal or gingival bleeding
- Hair (dry, brittle, thinning)

Chest and Abdomen

- Presence of swollen lymph nodes in armpits or groin
- Rapid respirations; shortness of breath on exertion
- Rapid pulse rate at rest
- Widened pulse pressure (greater distance between systolic and diastolic pressure)
- Epigastric tenderness
- Abdominal distention

Extremities

- Presence of swollen or painful joints
- Different lengths of fingers and toes

Urine and Stool

- Signs of blood

Physical Assessment

Skin. Although pallor may be a sign of anemia, it is not the most reliable sign. Many other factors can affect a person's complexion and skin color, including thickness of the skin, amount of skin pigment, and number and distribution of blood vessels near the surface of the skin. Pale mucous membranes or pale conjunctiva of the eye are better indicators of anemia. A very ruddy complexion with a red, florid appearance is typical of an excessive number of red blood cells **(polycythemia).**

Jaundice, or a yellowing discoloration of the skin and sclera of the eyes, can occur as a result of excessive destruction of red blood cells (hemolysis). When red blood cells are ruptured, bilirubin is released. The pigment eventually finds its way into the bloodstream, where it causes jaundice. If hemolysis is occurring, the urine will often contain bilirubin, giving urine a brown tea color.

Bruises and small, red, pinpoint lesions **(petechiae)** are typical of thrombocytopenic purpura, a hemorrhagic disease sometimes associated with a decrease in the number of circulating platelets. In dark-skinned people, check the palms of the hands and soles of the feet for petechiae. Bleeding under the skin and formation of bruises in response to the slightest trauma frequently occur in anemias, leukemias, and diseases affecting the bone marrow and spleen. These appear as darker areas on brown-skinned people.

Elder Care Points

- Elderly people bruise more easily because of thinner skin and greater fragility of blood vessel walls.
- Aspirin, omega-3 fatty acids, vitamin E, ginkgo biloba, and some prescription drugs also may make elderly people more prone to bruising.
- Bruising is not necessarily an unusual sign in this age group.

Cyanosis, or a bluish tint to the skin, can indicate hypoxia resulting from inadequate numbers of circulating erythrocytes. The gums or the roof of the mouth are the best places to check for a bluish color in dark-skinned people.

Mucous Membranes. Nutritional deficiencies contributing to anemia and resultant hypoxia may cause sore and painful gums and tongue. The patient may have difficulty chewing and eating. The tongue may be smooth and beefy red. Bleeding of the gums **(gingivitis)** may occur with toothbrushing when the platelet count is low.

Abdomen. Stomach pain or nausea can be caused by bleeding ulcers (a frequent cause of chronic blood loss). Black, tarry stools or coffee-ground emesis indicates gastrointestinal (GI) bleeding. Hiatal hernia also can cause a chronic blood loss.

Assignment Considerations

Observing for Blood

If a nursing assistant will be assisting the patient with toileting, remind that person to check stool for signs of **melena** (dark stool containing blood pigments) and the urine for a smoky color (indicating blood).

Clinical Cues

For the hospitalized patient with thrombocytopenia, abdominal girth should be measured daily to detect internal bleeding. Place marks on the lateral aspects of the abdomen where the measuring tape is placed and measure at the umbilicus. Put the measuring tape in the same place each day.

Swollen and Painful Joints. Bleeding into the joints **(hemarthrosis)** is not uncommon in certain kinds of anemia or in hemophilia. This might be evidenced by swelling and slight redness in the area of the joints, or the patient may move more slowly and with obvious discomfort.

Lymph Tissue Involvement. Enlarged lymph nodes occur in a number of different blood disorders, as well as in infections and immune disorders. The nodes most often inspected and palpated are those under the arm, in the neck, and in the inguinal (groin) region. Lymph node enlargement is often found while bathing a patient or helping her with activities of daily living (ADLs).

Assignment Considerations

Changes to Report

When assigning tasks to a certified nursing assistant (CNA) or unlicensed assistive personnel (UAP), ask the person to report any swellings he notices when assisting the patient with bathing. State that the patient may bruise easily and ask to report any new bruised areas or patient complaints of bleeding of gums or elsewhere.

Enlargement of the spleen, which also accompanies polycythemia and several other blood disorders, might be described by the patient as a feeling of fullness on the left side of the upper abdomen. Palpate the abdomen gently in a patient with a suspected blood disorder. Do not palpate deeply if there is tenderness in the area of the spleen, as this could cause rupture of the spleen.

Mental State. Irritability and mental depression are often found in patients with blood disorders. Irritability, dizziness, difficulty in concentrating, and headache may be caused by a decreased supply of oxygen to the brain. Depression often accompanies the chronic lack of energy, difficulty in eating and enjoying food, and the many other problems from which patients with blood disorders often suffer.

Elder Care Points

An elderly person who has developed pernicious anemia may present with confusion and a loss of mental faculties. This state may be initially thought to be Alzheimer's disease. A blood count is important to establish the correct diagnosis.

Activity Intolerance. Physical activity increases the demand for oxygen, but if there are not enough circulating RBCs to carry the necessary oxygen, the patient becomes physically weak and unable to engage in physical activity without severe fatigue. Note whether the patient is able to do things for herself or needs help to complete specific ADLs.

Think Critically

- Can you name four signs or symptoms that you might encounter when taking a patient's history that could indicate your patient may be anemic?
- How can the conjunctiva and the sclera of the eye provide information about anemia or jaundice?
- What signs and symptoms might indicate that the patient is suffering a chronic blood loss?

Nursing Diagnosis

Nursing diagnoses for hematologic and lymphatic disorders are based on the problems the disorders cause for the patient. Nursing diagnoses commonly associated with hematologic disorders are listed in Table 16-2. They must be individualized for each patient.

Planning

Plan nursing care to provide rest periods for the patient. For patients with anemia, plan dietary teaching or consultation with the dietitian. **The patient with a blood abnormality is at higher risk for infection, so it is extremely important to use aseptic technique.** Patients with a blood abnormality should not be exposed to people who are ill with contagious diseases, such as colds or influenza. Nursing goals include:

- Prevent infection.
- Conserve patient's energy and prevent undue fatigue.
- Correct nutritional deficiencies.
- Provide treatment to halt or slow disease process.
- Control pain or discomfort.

Specific expected outcomes are written for individualized nursing diagnoses.

Table 16-2 Common Nursing Diagnoses, Expected Outcomes, and Interventions for Patients with Blood Disorders

NURSING DIAGNOSIS	GOALS/EXPECTED OUTCOMES	NURSING INTERVENTIONS
Imbalanced nutrition: less than body requirements, related to iron deficiency from inadequate intake, blood loss, vitamin B_{12} deficiency.	Protein levels will be within normal limits within 6 wk. Hemoglobin levels will be within normal range within 3 mo. CBC shows increasing RBCs and Hb within 3 wk. The patient will administer her own B_{12} injections on a regular schedule.	Teach the patient about foods that meet required needs. Obtain dietary consultation as needed. Administer iron preparation; if liquid, give through straw. Give iron with juice or food containing vitamin C. Warn that stool may be greenish black. Monitor CBC count for evidence of increase in RBCs and Hg. Administer vitamin B_{12} as ordered; advise that lifetime therapy is needed.
Impaired tissue integrity, related to inflammation of mucous membranes	The patient performs mouth care diligently on schedule. Patient displays normal-appearing mucous membranes.	Give gentle mouth care before meals and q 2 hr. Provide bland, easily chewed foods.
Activity intolerance, related to decreased RBCs or Hb	Patient uses oxygen as ordered. Patient alternates activities with rest. Patient seeks assistance with ambulation when dizzy.	Administer oxygen by nasal cannula at 3–6 L/min as ordered for patient with sickle cell crisis. Space activities, allowing rest periods for patient with fatigue. Assist with ADLs to prevent fatigue. If dizzy, caution to change position slowly; call for assistance with ambulation.
Pain, related to ischemia and swollen joints	Patient verbalizes that pain is controlled by analgesics. Patient verbalizes that pain has decreased within 48 hr.	Elevate swollen joints, and apply hot or cold packs. Teach to avoid strenuous exercise. Use bed cradle to support bed covers. Administer analgesics as ordered PRN.
Risk for injury, related to low platelet count	Platelet count will be within safe limits after platelet administration. Patient will have no new hematoma formation or other evidence of bleeding.	Assess for signs of internal bleeding (bruises, blood in urine or stool); measure abdominal girth q day. Minimize trauma; handle gently. Apply ice packs and gentle pressure if hematoma seems to be forming. Monitor administration of platelets PRN. Use small-gauge needle for injections; rotate sites. Apply pressure to puncture site for 10 min.
Risk for infection, related to decreased leukocytes	Patient will have no evidence of infection.	Observe for early signs of infection and report. Use strict aseptic technique for wound care and invasive procedures. Use protective isolation as needed. Teach patient good personal hygiene. Maintain integrity of skin and mucosa. Administer anti-infective drugs precisely as ordered.
Deficient knowledge, related to substances that damage bone marrow	Patient will verbalize knowledge of drugs and chemicals that are harmful to the bone marrow within 1 wk.	Assess for exposure to substances that could have damaged the bone marrow. Teach about drugs and chemicals that are harmful to bone marrow and how to prevent damage. Seek feedback to validate understanding of content taught.

ADLs, activities of daily living; *CBC*, complete blood count; *Hb*, hemoglobin; *PRN*, as needed; *RBCs*, red blood cells.

Continued

Table 16-2 Common Nursing Diagnoses, Expected Outcomes, and Interventions for Patients with Blood Disorders—cont'd

NURSING DIAGNOSIS	GOALS/EXPECTED OUTCOMES	NURSING INTERVENTIONS
Anxiety, related to unknown outcome of diagnostic tests and knowledge of disease, treatment, and prognosis	Patient will verbalize purpose and expected experience for each diagnostic test ordered. Patient verbalizes fears regarding disease, treatment, and prognosis.	Provide teaching regarding each diagnostic test. Encourage verbalization of fears. Offer emotional support to patient and family.
Situational chronic low self-esteem, related to inability to perform usual activities	Patient will define ways to cope with physical limitations. Patient will verbalize strengths. Patient will discuss possibility of seeking counseling.	Assist to cope with limitations of the illness. Help plan ways to maintain appropriate activity. Help to focus on the things she can still do. Obtain counseling referral if psychological disturbance indicates need.
Risk of disabled family coping, related to expense of treatment and possible death of patient	Patient and family will seek assistance from community resources as needed. Patient and family will verbalize understanding of disease, treatment modalities, and their implications.	Refer leukemia patient and family to community resources, such as the American Cancer Society, for assistance. Assist family and patient to understand the disease, treatment modalities, and their implications. Encourage attendance for all family members in a support group. Obtain referral to social worker for further assistance. Encourage open communication within family.

Implementation

Handle patients with blood dyscrasias gently to prevent bruising and hematomas. Take care to apply pressure for 5 to 10 minutes after injections or venipuncture. Good skin care is essential, as the skin acts as a protective barrier against infection. Teach about nutrition and medication administration, prevention of infection, and measures to prevent bleeding. Pain control is important for the patient with sickle cell anemia in crisis, the hemophiliac with hemarthrosis, and for the advanced leukemia patient.

Assignment Considerations

Report Oozing of Blood

Although the nurse is responsible for checking the patient for signs of bleeding, when a patient with a blood disorder has had blood drawn or an invasive procedure, ask the CNA or UAP to report any oozing noticed at the site or on bandages when he is providing basic care such as feeding or toileting.

Think Critically

When caring for a patient who has been in an automobile accident and has sustained trauma to the trunk of the body, what laboratory values should the nurse check daily?

See Table 16-2 for specific interventions for patients experiencing blood disorders. Other interventions are included in the discussion of the various disorders in Chapter 17.

Evaluation

The evaluation process provides data to determine whether the specific outcome criteria are being met for each patient. Monitor laboratory values for blood counts and determine whether counts are improving to determine if treatment and nursing actions are meeting the patient's needs. Assess for side effects and evaluate how the patient is tolerating the medication or other treatment for the underlying disorder.

Home Care Considerations

Evaluating Treatment

It is important that each home care nurse evaluate how closely the patient is following the prescribed treatment plan. Determine whether the treatment is effective, and if it is not effective, consult the physician about changing the plan.

Clinical Cues

When a patient with leukemia is undergoing chemotherapy, evaluate the blood count results to determine that safe levels of leukocytes and platelets are present before administering another dose of a drug that inhibits their production.

COMMON PROBLEMS RELATED TO DISORDERS OF THE HEMATOLOGIC SYSTEM

EXCESSIVE BLEEDING

When injury has occurred, or spontaneous bleeding happens, you should immediately apply pressure to stop the bleeding (Figure 16-3). Severe bleeding can lead to irreversible hypovolemic shock and circulatory collapse from loss of intravascular fluid. Blood loss from an artery is bright red and will gush forth in spurts at regular intervals as the heart contracts. Blood from a severed or punctured vein leaks slowly and steadily and is dark red. Box 16-2 presents methods of controlling bleeding. If bleeding is due to absence of sufficient clotting factors, a transfusion of that factor or of platelets will be ordered. See Chapters 3 and 17 for information on transfusions.

Clinical Cues

Blood loss in the GI tract from an ulcer, tumor, or hiatal hernia can be in small amounts or in a large enough amount to make stool appear black (melena). Loss of 50 to 75 mL of blood from the upper GI tract is required before melena will appear.

FATIGUE

Help decrease fatigue by spacing activities throughout the day, with frequent rest periods. Assure the patient that her stamina will improve as her red cell count and hemoglobin rise. Work with the patient and family to decrease chores and expectations while fatigue is being experienced. Fatigue is common with anemia, and it affects all aspects of the patient's life (Agnihotri et al., 2007).

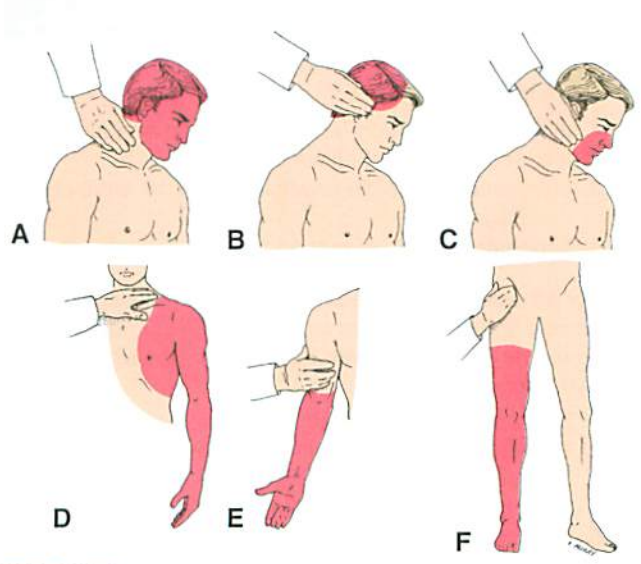

FIGURE 16-3 Locations of commonly used digital pressure points to stop hemorrhage. The screened areas are those within which hemorrhage may be controlled by pressure on a specific artery. **A,** Carotid artery. **B,** Temporal artery. **C,** External maxillary artery. **D,** Subclavian artery. **E,** Brachial artery. **F,** Femoral artery.

Box 16-2 Techniques to Control Bleeding*

- Position the body part that is bleeding over a firm surface and immobilize the part.
- Place a sterile dressing or clean cloth over the wound.
- With the flat palm of the hand or several fingers, apply direct pressure on the wound continuously for 5 minutes.
- Check whether bleeding has stopped after 5 minutes; if bleeding is occurring, apply pressure continuously for another 10 minutes.
- When bleeding has stopped, gently remove hand pressure and apply a pressure dressing over the cloth or dressing by folding another dressing or piece of cloth several times and tying it firmly over the wound.
- Check circulation distal to the wound to be certain that the pressure dressing is not so tight that circulation below the wound is cut off.
- Reinforce the dressing as needed by applying yet another layer of dressing as blood soaks through; do not remove previously applied dressings.
- If direct pressure will not stop the bleeding, and bleeding is considerable, apply pressure over the artery leading to the wound. **(Cut off arterial flow only as a last resort.)**
- Check for adequate pressure over the artery by determining a lack of pulse distal to the wound and patient report of a sensation of tingling and numbness in the wound area.

*Severe bleeding can lead to irreversible hypovolemic shock from loss of intravascular fluid and to circulatory collapse.

ANOREXIA

Serve small, frequent meals high in protein, vitamin C, and iron, unless contraindicated. Provide mouth care before each meal. Offer foods that are appealing to the patient. Keep the eating environment pleasant and free of odors. Ask family to sit with the patient, to offer socialization and encouragement during meals.

PAIN

If the patient is experiencing pain, all comfort measures should be employed. Assess pain level at least every 4 hours and medicate as ordered. Teach relaxation and imagery and assist the patient to perform these techniques (see Chapter 7). Pain may escalate quickly for the sickle cell anemia patient in crisis, so assess pain level at least every 2 hours.

INFECTION

When a patient is moderately to severely anemic, the oxygen-carrying capacity of the blood is considerably decreased. Less than optimal tissue perfusion and tissue hypoxia make it easier for pathogens to invade and cause infection. When WBCs are decreased or abnormal, there are fewer cells to fight infection. Patients with abnormalities of the blood need to be taught how to protect themselves from infection. Good hand hygiene is essential. Staying away from crowds and

individuals with infections is necessary. Getting enough sleep and eating a well-balanced diet help keep the immune system as healthy as possible under the circumstances. Prophylactic antibiotics may be given in certain situations. Precautions for the patient who is prone to infection because of neutropenia are located in Chapters 8 and 17.

If the patient develops an infection, close monitoring of therapy and symptoms is needed. Rest, plenty of fluids, and sufficient protein and vitamin C are required to help the patient heal.

BONE MARROW FAILURE

Bone marrow failure occurs from abnormal cells overcrowding the normal cells or from inadequate production of normal cells. Leukemia causes overproliferation of abnormal cells in the bone marrow. Chemotherapy and radiation, thrombocytopenic purpura, and chemical toxicity can be factors in bone marrow failure. Predisposition to anemia, thrombocytopenia, and decreased WBCs occur. Sometimes bone marrow recovery occurs if the toxic agent is avoided, but usually a bone marrow transplant or stem cell transplant is necessary.

Get Ready for the NCLEX® Examination!

Key Points

- When there is a decreased number of RBCs or decreased hemoglobin, there is a reduction in the amount of oxygen that reaches the cells.
- Leukocytes are the first line of defense against microbial agents.
- Neutrophils perform phagocytosis.
- Lymphocytes such as B cells and T cells destroy foreign proteins.
- Platelets are the first line of cell protection to prevent bleeding when trauma has occurred.
- When the platelet count is low, spontaneous bleeding may occur.
- Bone marrow activity decreases by 50% in the elderly.
- Blood in the elderly coagulates more easily due to platelet *aggregation* (sticking together).
- Hemophilia, sickle cell disease, and certain types of anemias that cause blood disorders are inherited.
- Blood dyscrasias may be caused by drugs, radiation, or toxic substances (see Box 16-1).
- Nutritional deficiencies can cause anemia.
- The CBC with a differential count (count of the different types of white cells) can help diagnose many blood disorders (see Table 16-1).
- Bone marrow aspiration is used to diagnose a variety of blood disorders.
- A history is gathered and a focused physical assessment is performed for the patient with a suspected blood disorder.
- There are common nursing diagnoses appropriate for the patient with a blood disorder (see Table 16-2).
- Preventing infection, conserving energy, controlling pain, and correcting the underlying cause are the goals of care for the patient with a blood disorder.
- Patients with blood disorders must be handled gently.
- Checking serial CBCs is part of the evaluation process.
- Methods to stop bleeding should be taught to patients and families.
- Self-care measures are taught to each patient to prevent infection.

Additional Learning Resources

SG Go to your Study Guide for additional learning activities to help you master this chapter content.

Evolve Go to your Evolve website (http://evolve.elsevier.com/deWit/medsurg) for the following FREE learning resources:

- Animations, audio, and video
- Answers and rationales for questions and activities
- Concept Map Creator
- Glossary with pronunciations in English and Spanish
- Interactive Review Questions and Exercises and more!

Review Questions for the NCLEX® Examination

1. For a patient with the clinical finding of leukocytosis, the nurse should:
   1. initiate transmission-based isolation precautions.
   2. inspect for signs of active bleeding.
   3. anticipate a possible physician order for antibiotic coverage.
   4. schedule periods of rest and activity.

2. For an elderly patient admitted for recent falls, which clinical finding(s) relative to the hematologic system would be associated with the aging process? *(Select all that apply.)*
   1. Decreased hematocrit and red blood cells
   2. Decreased antibody buildup from flu immunization
   3. Prolonged prothrombin time and sedimentation rate
   4. Increased neutrophils to fight infection
   5. Increased coagulability, which predisposes to clots

3. The physician informs the nurse that the patient has a "shift to the right." Which CBC laboratory result indicates a shift to the right?
   1. 13.8, RBC 4.4 mm^3, WBC 12.4 mm^3, Neus 72%, Eos 1%, Lymphs 29%, Monos 1%, Platelets 268,000
   2. 14.2, RBC 4.6 mm^3, WBC 4.4 mm^3, Neus 58%, Lymphs 36%, Platelets 285,000
   3. 14.8, RBC 4.2 mm^3, WBC 10.8 mm^3, Neus 62%, Eos 2%, Lymphs 29%, Platelets 360,000
   4. 10.8, RBC 3.2 mm^3, WBC 12.2 mm^3, Neus 56%, Lymphs 27%, Platelets 294,000

4. To confirm the diagnosis of pernicious anemia, the patient undergoes a Schilling test. This test involves a(n):
   1. oral dose of vitamin B_{12} followed by collection of a 24-hour urine specimen.
   2. oral dose of a multivitamin containing B_{12}, followed by an injection of B_{12}.
   3. B_{12} injection followed by collection of a 24-hour urine specimen.
   4. dose of radioactive vitamin B_{12} followed by an injection of B_{12} and collection of a 24-hour urine specimen.

5. The nurse describes the patient's skin as having a ruddy complexion with a red, florid appearance. The condition is most likely caused by:
   1. increased red blood cells.
   2. decreased platelets.
   3. increased basophils.
   4. decreased neutrophils.

6. The patient displays characteristic pinpoint red lesions. This assessment finding is called _____ and is often caused by _____.
   1. ecchymosis; vitamin B_{12} deficiency
   2. thrombocytopenic purpura; platelet deficiency
   3. angioedema; iron deficiency anemia
   4. petechiae; bruising of the skin

7. The nurse taking care of an elderly woman with pernicious anemia demonstrates understanding of the functional implications by:
   1. promoting adequate rest.
   2. actively listening to the patient's concerns.
   3. monitoring for bleeding.
   4. administering antibiotics.

8. The nurse initiates neutropenic precautions for a patient who has undergone chemotherapy. Which nursing action(s) would be considered appropriate? *(Select all that apply.)*
   1. Use clean technique for wound care and invasive procedures.
   2. Use transmission-based isolation precautions as needed.
   3. Allow all visitors as desired.
   4. Maintain integrity of skin and mucosa.
   5. Provide analgesics, as needed.

9. The nurse formulates the following expected outcome for a patient admitted with hemarthrosis: "The patient will have no new hematomas or other evidence of bleeding." The most appropriate nursing intervention would be to:
   1. suggest the patient use a soft toothbrush.
   2. handle the patient very gently, protecting joints.
   3. keep the skin well lubricated.
   4. place the patient on a mechanical soft diet.

10. After removing a peripheral vascular access device, the nurse notes bleeding at the site. Put the following nursing actions in order of priority.
    1. Tape a sterile dressing over the site.
    2. Check for other areas of bleeding.
    3. Apply direct pressure.
    4. Elevate the extremity.

Critical Thinking Activities

Scenario A

You come upon an automobile accident and stop to help.

1. The first victim has a gash in his thigh and blood is spurting at regular intervals from the wound. What method would you use to stop the bleeding?
2. The second victim has a bleeding wound on the forehead. What method would you use to stop the bleeding?

Scenario B

Mr. Jones has a disorder that has caused leukopenia. He lives alone. To prepare him for discharge home, you would need to provide teaching for him.

1. What would you teach him about preventing infection?
2. What would you suggest regarding visitors who wish to see him?
3. What would you tell him about performing necessary errands?

Scenario C

Your 38-year-old male patient has a history of seizures and takes phenytoin. He has developed mild hypertension and takes hydrochlorothiazide to control the blood pressure.

1. What would you teach him about measures to prevent blood disorders?
2. What would you recommend to him for monitoring possible problems?

chapter

17 Care of Patients with Hematologic Disorders

evolve

http://evolve.elsevier.com/deWit/medsurg

Objectives

Theory

1. Identify the causes of the various types of anemias.
2. Develop a plan of care for the patient with an anemia.
3. Explain the pathophysiology and care of sickle cell disease.
4. Compare cell abnormalities of polycythemia vera to those of leukemia.
5. Formulate a teaching plan for the patient with leukemia.
6. Comprehend why multiple myeloma is a disease affecting older people.
7. Discuss the problems and treatments the hemophilia patient faces.

Clinical Practice

1. Considering the goals of care, write expected outcomes for each of the appropriate nursing diagnoses for a patient with a blood disorder.
2. Prepare to provide preprocedure and postprocedure care for the patient undergoing a bone marrow aspiration.
3. Perform an assessment on a patient with a suspected hematologic disorder.
4. Assist with the development of a plan of care for an adult with leukemia.
5. Assess for signs and symptoms of disseminated intravascular coagulation.

Key Terms

allogeneic (ĂL-ō-JĒN-ĭk, p. 364)
anemia (ă-NĒ-mē-ă, p. 346)
autologous (ăw-TŎL-ō-gŭs, pp. 362, 364)
disseminated intravascular coagulation (DIC) (dĭ-SĔM-ĭ-nāt-ĕd ĭn-tră-VĂS-cū-lăr kō-ăg-ū-LĀ-shŭn, p. 362)
ecchymoses (ĕk-ĭ-MŌ-sēz, p. 359)
hemarthrosis (hē-măr-THRŌ-sĭs, p. 361)
hemolysis (hē-MŎL-ĭ-sĭs, p. 347)
hypovolemia (hī-pō-vō-LĒ-mē-ă, p. 346)
leukapheresis (lū-kă-fē-RĒ-sĭs, p. 356)
purpura (PŬR-pū-ră, p. 359)
splenomegaly (splē-nō-MĔG-ă-lē, p. 354)
stomatitis (stō-mă-TĪ-tĭs, p. 359)
thrombocytopenia (thrŏm-bō-sīt-ō-PĒ-nē-ă, p. 359)

DISORDERS OF THE HEMATOLOGIC SYSTEM

ANEMIA

In the human body, healthy red blood cells (RBCs) carry oxygen to tissues. A balance is maintained between the production of new RBCs and the disposal of old "worn-out" RBCs. Anemia occurs when something interferes with this balance or interferes with the maturation of cells. **Anemia** is a state in which there are insufficient numbers of functioning RBCs, or a lack of hemoglobin, to meet the demands of the tissues for oxygen.

Etiology

There are three major classifications of anemia, according to cause:

- Anemia resulting from blood loss
- Anemia resulting from a failure in blood cell production
- Anemia associated with an excessive destruction of red cells

Rapid, severe bleeding leads to anemia from blood loss, **hypovolemia** (decreased volume of circulating blood), and, potentially, shock. A blood loss that leads to anemia may result from severe trauma to the blood vessels and massive hemorrhage or the blood loss may be more gradual, as from a small, bleeding peptic ulcer that causes a chronic blood loss.

The amount of blood loss that leads to hypovolemic shock varies, depending on the ability of the patient's body to compensate for the lost fluid volume. A blood loss of even 500 mL in an adult who had normal circulating volume may cause hypovolemic shock. See Chapter 45 for the treatment of shock. Table 17-1 shows the amount of blood loss and consequent clinical manifestations.

Anemia caused by a failure in cell production is the result of either a deficiency of certain substances