Bone marrow specimens are obtained by either aspiration or biopsy. The preferred site for bone marrow aspiration is the posterior iliac crest; the sternum may also be used. The procedure is performed by inserting a needle into the bone and drawing out a sample of the blood in the marrow. A bone marrow biopsy is performed by making a small incision over the bone and screwing a core biopsy instrument into the bone to obtain a specimen. Bone marrow studies are used to diagnose leukemias, metastatic cancer, lymphoma, aplastic anemia, and Hodgkin’s disease.

Preparation of the Client
- Explain the purpose and procedure of the test.
- Record vital signs.
- Ask the client to void.
- Place in supine position if the specimen will be obtained from the sternum or anterior iliac crest; prone position if the posterior iliac crest will be used.
- Assist in remaining still during the procedure.

After the Procedure
- Apply pressure to the puncture site for 5 to 10 minutes.
- Assess vital signs, and compare results to preprocedure readings.
- Apply a dressing to the puncture site, and monitor for bleeding and infection for 24 hours.

Client and Family Teaching
- The procedure (either aspiration or biopsy) takes about 20 minutes.
- A sedative may be given prior to the procedure.
- It is important to remain very still during the procedure to prevent accidental injury.
- Although the area will be anesthetized with a local anesthetic, insertion of the needle will be painful for a short time. Taking deep breaths may make this part of the procedure less painful.
- The aspiration site may ache for 1 or 2 days.
- Report any unusual bleeding immediately.

Medications
Medications used to treat anemia depend on its cause. Iron replacement therapy is ordered for iron deficiency anemia. Supplemental iron may be given by mouth or intramuscularly. Parenteral vitamin B₁₂ is given when malabsorption or lack of intrinsic factor leads to vitamin B₁₂ deficiency anemia. Folic acid is ordered for women of childbearing age, pregnant women, and clients with folic acid deficiency or sickle cell anemia to meet the increased demands of the bone marrow. Hydroxyurea, a drug that promotes fetal hemoglobin production, may be prescribed for clients with sickle cell disease. Resulting increased levels of fetal hemoglobin interfere with the sickling process and reduce the incidence of painful crises (Braunwald et al., 2001). Nursing implications for clients receiving iron, vitamin B₁₂, and folic acid are found in the Medication Administration box on page 943.

Immunosuppressive therapy with antithymocyte globulin (ATG), corticosteroids, and cyclosporine may be used to treat aplastic anemia. Androgens may stimulate blood cell production in some clients with aplastic anemia. See Chapter 9 for more information about immunosuppression.

Dietary Therapy
Dietary modifications are recommended for nutritional deficiency anemias, such as iron deficiency anemia, vitamin B₁₂ deficiency anemia, or folic acid deficiency anemia. Box 32–5 identifies good sources of dietary iron, vitamin B₁₂, and folic acid.

Blood Transfusion
Blood transfusions may be indicated to treat anemias resulting from major blood loss, such as from trauma or major surgery, and severe anemia regardless of cause. Blood transfusions are fully discussed in Chapter 6.

Iron in the diet comes from two sources. Heme iron makes up about one-half of the iron from animal sources. Nonheme iron includes the remaining iron from animal sources and all the iron from plants, legumes, and nuts. Heme iron promotes absorption of nonheme iron from other foods when both forms are consumed at the same time. Absorption of nonheme iron is also enhanced by vitamin C and inhibited by tea and coffee.

Sources of Heme Iron
- Beef
- Pork loin
- Chicken
- Egg yolk
- Clams, oysters
- Veal

Sources of Nonheme Iron
- Bran flakes
- Brown rice
- Whole-grain breads
- Dried beans
- Dried fruits
- Greens
- Oatmeal

Sources of Folic Acid
- Asparagus
- Broccoli
- Organ meats
- Eggs
- Wheat germ
- Kidney beans

Sources of Vitamin B₁₂
- Liver
- Fresh shrimp and oysters
- Eggs
- Milk
- Kidney
- Meats (muscle)
- Cheese