chapter 45

Agents Used in the Treatment of Anemia

Key Terms

anemia
folinic acid or leucovorin rescue
intrinsic factor
iron deficiency anemia
megaloblastic anemia
pernicious anemia

Chapter Objectives

On completion of this chapter, the student will:

- Describe the different types of anemia
- List the drugs used in the treatment of anemia.
- Discuss the actions, uses, general adverse reactions, contraindications, precautions, and interactions of the agents used to treat anemia.
- Discuss important preadministration and ongoing assessment activities the nurse should perform on a patient receiving an agent used to treat anemia.
- Identify nursing diagnoses particular to a patient receiving an agent used to treat anemia.
- Discuss ways to promote an optimal response to therapy and important points to keep in mind when educating patients about the use of an agent used to treat anemia.

Anemia is a decrease in the number of red blood cells (RBCs), a decrease in the amount of hemoglobin in RBCs, or both a decrease in the number of RBCs and hemoglobin. When there is an insufficient amount of hemoglobin to deliver oxygen to the tissues, anemia exists. There are various types and causes of anemia. For example, anemia can be the result of blood loss, excessive destruction of RBCs, inadequate production of RBCs, and deficits in various nutrients, such as in iron deficiency anemia. Once the type and cause have been identified, the primary health care provider selects a method of treatment.

The anemias discussed in this chapter include iron deficiency anemia, anemia in patients with chronic renal disease, pernicious anemia, and anemia resulting from a folic acid deficiency. Table 45-1 defines these anemias. Drugs used in treatment of anemia are summarized in the Summary Drug Table: Drugs Used in the Treatment of Anemia.

DRUGS USED IN THE TREATMENT OF IRON DEFICIENCY ANEMIA

Iron deficiency anemia is by far the most common type of anemia. Iron is a component of hemoglobin, which is in RBCs. It is the iron in the hemoglobin of RBCs that picks up oxygen from the lungs and carries it to all body tissues. Iron is stored in the body and is found mainly in the reticuloendothelial cells of the liver, spleen, and bone marrow. When the body does not have enough iron to supply the body's needs, the resulting condition is **iron deficiency anemia.**

ACTIONS AND USES

Iron salts, such as ferrous sulfate or ferrous gluconate, are used in the treatment of iron deficiency anemia, which occurs when there is a loss of iron that is greater than the available iron stored in the body. Iron preparations act by elevating the serum iron concentration, which replenishes hemoglobin and depleted iron stores.

Iron dextran is a parenteral iron that is also used for the treatment of iron deficiency anemia. It is primarily used when the patient cannot take oral drugs or when the patient experiences gastrointestinal intolerance to oral iron administration. Other iron preparations, both oral and parenteral, used in the treatment of iron deficiency anemia can be found in the Summary Drug Table: Drugs Used in the Treatment of Anemia.

TABLE 45-1 Anemias

TYPE OF ANEMIA	DESCRIPTION
Iron deficiency	Anemia characterized by an inadequate amount of iron in the body to produce hemoglobin
Anemia in chronic renal failure (CRF)	Anemia resulting from a reduced production of erythropoietin, a hormone secreted by the kidney that stimulates the production of red blood cells (RBCs)
Pernicious anemia	Anemia resulting from lack of secretions by the gastric mucosa of the intrinsic factor essential to the formation of RBCs and the absorption of vitamin B_{12}
Folic acid deficiency	A slowly progressive type of anemia occurring because of the lack of folic acid, a component necessary in the formation of RBCs

ADVERSE REACTIONS

Iron salts occasionally cause gastrointestinal irritation, nausea, vomiting, constipation, diarrhea, headache, backache, and allergic reactions. The stools usually appear darker (black). Iron dextran is given by the parenteral route. Hypersensitivity reactions, including fatal anaphylactic reactions, have been reported with the use of this form of iron. Additional adverse reactions include soreness, inflammation, and sterile abscesses at the intramuscular (IM) injection site. Intravenous (IV) administration may result in phlebitis at the injection site. When iron is administered via the IM route, a brownish discoloration of the skin may occur. Patients with rheumatoid arthritis may experience an acute exacerbation of joint pain, and swelling may occur when iron dextran is administered.

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Drugs used to treat anemia are contraindicated in patients with known hypersensitivity to the drug or any component of the drug. Iron compounds are contraindicated in patients with any anemia except iron deficiency anemia. Iron compounds are used cautiously in patients with tartrazine or sulfite sensitivity because some iron compounds contain these substances. Oral iron preparations are Pregnancy Category B drugs; iron dextran is a Pregnancy Category C drug. The iron preparations are used cautiously during pregnancy and lactation. Iron dosages of 15 to 30 mg/d are sufficient to meet the needs of pregnancy. Iron dextran is used cautiously in patients with cardiovascular disease, a history of asthma or allergies, and rheumatoid arthritis (may exacerbate joint pain).

The absorption of oral iron is decreased when the agent is administered with antacids, tetracyclines, penicillamine, and the fluoroquinolones. When iron is administered with levothyroxine, there may be a decrease in the effectiveness of levothyroxine. When administered orally, iron deceases the absorption of levodopa. Ascorbic acid increases the absorption of oral iron. Iron dextran administered concurrently with chloramphenicol increases serum iron levels.

DRUGS USED IN THE TREATMENT OF ANEMIA ASSOCIATED WITH CHRONIC RENAL FAILURE

Anemia may occur in patients with chronic renal failure as the result of the inability of the kidney to produce erythropoietin. Erythropoietin is a glycoprotein hormone synthesized mainly in the kidneys and used to stimulate and regulate the production of erythrocytes or red blood cells (RBCs). Failure to produce the needed erythrocytes results in anemia. Two examples of drugs used to treat anemia associated with chronic renal failure are epoetin alfa (Epogen) and darbepoetin alfa (Aranesp).

ACTIONS AND USES

Epoetin alfa is a drug that is produced using recombinant DNA technology. The drug acts in a manner similar to that of natural erythropoietin. Epoetin alfa is used to treat anemia associated with chronic renal failure, anemia in patients with cancer who are receiving chemotherapy, and in patients with anemia who are undergoing elective nonvascular surgery. Darbepoetin alfa (Aranesp) is an erythropoiesis-stimulating protein produced in Chinese hamster ovary cells by recombinant DNA technology. Darbepoetin stimulates erythropoiesis by the same manner as natural erythropoietin. The drug is used to treat anemia associated with chronic renal failure in patients receiving dialysis as well as for patients who are not receiving dialysis. These drugs elevate or maintain RBC levels and decrease the need for transfusions.

ADVERSE REACTIONS

Epoetin alfa (erythropoietin; EPO) and darbepoetin alfa are usually well tolerated. The most common adverse reactions include hypertension, headache, tachycardia, nausea, vomiting, diarrhea, skin rashes, fever, myalgia, and skin reaction at the injection site. See the Summary Drug Table: Drugs Used in the Treatment of Anemia for more information on these drugs.

SUMMARY DRUG TABLE DRUGS USED IN THE TREATMENT OF ANEMIA

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
darbepoetin alfa *dar-bah-poe-e'-tin*	Aranesp	Anemia associated with chronic renal failure	Hypertension, hypotension, headache, diarrhea, vomiting, nausea, myalgia, infection, cardiac arrhythmias, cardiac arrest	0.45 mcg/kg IV, SC weekly
epoetin alfa (Erythropoietin; (EPO) *e-po-e'-tin*	Epogen, procrit	Anemia associated with chronic renal failure, anemia related to zidovudine therapy in HIV-infected patients, anemia in cancer patients receiving chemotherapy, anemia in patients who undergo elective nonvascular surgery	Hypertension, headache, tachycardia, nausea, vomiting, skin rashes, fever, skin reaction at injection site	Individualized dosage CRF 50–100 U/kg (3 times weekly IV or SC), maintenance based on HCT, generally 25 U/kg 3 times weekly; zidovudine-treated HIV-infected patients: 100 U/kg 3 times weekly; cancer: 150 U/kg 3 times weekly; surgery: 300 U/kg/d SC x 10 d before surgery, on day of surgery and 4 days after surgery
ferrous fumarate (33% elemental iron) *fair'-us*	Feostat, *generic*	Prevention and treatment of iron deficiency anemia	GI irritation, nausea, vomiting, constipation, diarrhea, allergic reactions	Daily requirements: males, 10 mg/d PO; females, 18 mg/d PO; during pregnancy and lactation, 30–60 mg/d PO; replacement in deficiency states, 90–300 mg/d (6 mg/kg/d) PO for 6–10 months
ferrous gluconate (11.6% elemental iron)	Fergon, *generic*	Prevention and treatment of iron deficiency anemia	GI irritation, nausea, vomiting, constipation, diarrhea, allergic reactions	Daily requirements: males, 10 mg/d PO; females, 18 mg/d PO; during pregnancy and lactation, 30–60 mg/d PO; replacement in deficiency states, 90–300 mg/d (6 mg/kg/d) PO for 6–10 months
ferrous sulfate (20% elemental iron)	Feosol, Fer-In-Sol, *generic*	Prevention and treatment of iron deficiency anemia	GI irritation, nausea, vomiting, constipation, diarrhea, allergic reactions	Daily requirements: males, 10 mg/d PO; females, 18 mg/d PO; during pregnancy and lactation, 30–60 mg/d PO; replacement in deficiency states, 90–300 mg/d (6 mg/kg/d) PO for 6–10 months
folic acid *foe'-lik*	Folvite, *generic*	Megaloblastic anemia due to deficiency of folic acid	Allergic sensitization	Up to 1 mg/d PO, IM, IV, SC
iron dextran	DexFerrum, InFeD, *generic*	Iron deficiency anemia	Anaphylactoid reactions, soreness and inflammation at injection site, chest pain, arthralgia, backache, convulsions, pruritus, abdominal pain, nausea, vomiting, dyspnea	Dosage based on body weight and grams percent (g/dL) of hemoglobin IV, IM

(*continued*)

SUMMARY DRUG TABLE DRUGS USED IN THE TREATMENT OF ANEMIA (*Continued*)

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
iron sucrose	Venofer	Iron deficiency anemia	Hypotension, cramps, leg cramps, nausea, headache, vomiting, diarrhea, dizziness	100 mg elemental iron slow IV or during dialysis session
leucovorin calcium *loo-koe-vor'-in*	Wellcovorin, *generic*	Treatment of megaloblastic anemia leucovorin rescue after high-dose methotrexate therapy in osteosarcoma	Allergic sensitization, urticaria, anaphylaxis	Megaloblastic anemia: 1 mg/d IM rescue after methotrexate therapy: 12–15 g/m^2 PO or parentearally then 10 mg/m^2 q6h for 72 h; check serum creatinine after 24 h; if 50% greater than the pretreatment level, increase leucovorin dose to 100 mg/m^2 until serum methotrexate level is 15×10^{-8} M
sodium ferric gluconate complex	Ferrlecit	Iron deficiency	Flushing, hypotension, syncope, tachycardia, dizziness, pruritus, dyspnea, conjunctivitis, hyperkalemia	125 mg of elemental iron IV over at least 10 min
vitamin B_{12} (cyanocobalamin) *sye-an-oh-koe-bal'-a-min*	*generic*	B_{12} deficiencies as seen in pernicious anemia, GI pathology; also used when requirements for the vitamin are increased; Schilling's test	Mild diarrhea, itching, edema, anaphylaxis	Schilling's test: 100–1000 mcg/d x 2 wk, then 100-1000 mcg IM q mo

*The term *generic* indicates the drug is available in generic form.
GI, gastrointestinal; HIV, human immunodeficiency virus.

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Epoetin alfa is contraindicated in patients with uncontrolled hypertension, those needing an emergency transfusion, or those with a hypersensitivity to human albumin. Darbepoetin alfa (Aranesp) is contraindicated in patients with uncontrolled hypertension or in those allergic to the drug.

Epoetin alfa and darbepoetin alfa are used with caution in patients with hypertension, heart disease, congestive heart failure, or a history of seizures. Both of these drugs are Pregnancy Category C drugs and are used cautiously during pregnancy and lactation.

DRUGS USED IN THE TREATMENT OF FOLIC ACID DEFICIENCY ANEMIA

Folic acid is required for the manufacture of RBCs in the bone marrow. Folic acid is found in leafy green vegetables, fish, meat, poultry, and whole grains. A deficiency of folic acid results in **megaloblastic anemia.** Megaloblastic anemia is characterized by the presence of large, abnormal, immature erythrocytes circulating in the blood.

ACTION AND USES

Folic acid is used in the treatment of megaloblastic anemias that are caused by a deficiency of folic acid. Although not related to anemia, studies indicate there is a decreased risk for neural tube defects if folic acid is taken before conception and during early pregnancy. Neural tube defects occur during early pregnancy, when the embryonic folds forming the spinal cord and brain join together. Defects of this type include anencephaly (congenital absence of brain and spinal cord), spina bifida (defect of the spinal cord), and meningocele (a saclike protrusion of the meninges in the spinal cord or skull). The United States Public Health Service recommends the use of folic acid for all women of childbearing age to decrease the incidence of neural tube defects. Dosages during pregnancy and lactation are as great as 0.8 mg/d.

Leucovorin is a derivative (and active reduced form) of folic acid. The oral and parenteral forms of this drug are used in the treatment of megaloblastic anemia. Leucovorin may also be used to diminish the hematologic effects of (intentional) massive doses of methotrexate, a drug used in the treatment of certain types of cancer (see Chap. 55). Leucovorin "rescues" normal cells from the destruction caused by methotrexate and allows them to survive. This technique of administering leucovorin after a large dose of methotrexate is called **folinic acid rescue** or **leucovorin rescue.** Occasionally, high doses of methotrexate are administered to select patients. Leucovorin is then used either at the time methotrexate is administered or a specific number of hours after the methotrexate has been given to decrease the toxic effects of the methotrexate. Leucovorin may be ordered to be given via the IV, IM, or oral route.

ADVERSE REACTIONS

Few adverse reactions are associated with the administration of folic acid and leucovorin. Rarely, parenteral administration may result in allergic hypersensitivity.

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Folic acid and leucovorin are contraindicated for the treatment of pernicious anemia or for other anemias for which vitamin B_{12} is deficient. Folic acid is a Pregnancy Category A drug and is generally considered safe for use during pregnancy. Pregnant women are more likely to experience folate acid deficiency because folic acid requirements are increased during pregnancy. Pregnant women with a folate deficiency are at increased risk for complications of pregnancy and fetal abnormalities. The recommended daily allowance (RDA) of folate during pregnancy is 0.4 mg/d and during lactation, 0.26 to 0.28 mg/d. Although fetal harm appears remote, the drug should be used cautiously and only within the RDAs. Use of aminosalicylic with folic acid may decrease serum folate levels. Folic acid utilization is decreased when folate is administered with methotrexate. Signs of folic acid deficiency may occur when sulfasalazine is administered concurrently. An increase in seizure activity may occur when folic acid is administered with the hydantoins.

Leucovorin is a Pregnancy Category C drug and is used cautiously during pregnancy.

Leucovorin decreases the effectiveness of the anticonvulsants. There is an increased risk of 5-fluorouracil toxicity when the drug is administered with leucovorin.

DRUGS USED IN THE TREATMENT OF PERNICIOUS ANEMIA

Vitamin B_{12} is essential to growth, cell reproduction, the manufacture of myelin (which surrounds some nerve fibers), and blood cell manufacture. The **intrinsic factor,** which is produced by cells in the stomach, is necessary for the absorption of vitamin B_{12} in the intestine. A deficiency of the intrinsic factor results in abnormal formation of erythrocytes because of the body's failure to absorb vitamin B_{12}, a necessary component for blood cell formation. The resulting anemia is a type of megaloblastic anemia called **pernicious anemia.**

ACTIONS AND USES

Vitamin B_{12} (cyanocobalamin) is used to treat a vitamin B_{12} deficiency. A vitamin B_{12} deficiency may be seen in:

- Strict vegetarians
- Persons who have had a total gastrectomy or subtotal gastric resection (when the cells producing the intrinsic factor are totally or partially removed)
- Persons who have intestinal diseases, such as ulcerative colitis or sprue
- Persons who have gastric carcinoma
- Persons who have a congenital decrease in the number of gastric cells secreting intrinsic factor

Vitamin B_{12} is also used to perform the Schilling test, which is used to diagnose pernicious anemia.

Nursing Alert

Pernicious anemia must be diagnosed and treated as soon as possible because vitamin B_{12} deficiency that is allowed to progress for more than 3 months may result in degenerative lesions of the spinal cord.

A deficiency of this vitamin caused by a low dietary intake of vitamin B_{12} is rare because the vitamin is found in meats, milk, eggs, and cheese. The body is also able to store this vitamin; a deficiency, for any reason, will not occur for 5 to 6 years.

ADVERSE REACTIONS

Mild diarrhea and itching have been reported with the administration of vitamin B_{12}. Other adverse reactions that may be seen include a marked increase in RBC production, acne, peripheral vascular thrombosis, congestive heart failure, and pulmonary edema.

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Vitamin B_{12} is contraindicated in patients allergic to cobalt. Vitamin B_{12} is a Pregnancy Category A drug if administered orally and a Pregnancy Category C drug if given parenterally. Vitamin B_{12} is administered cautiously during pregnancy and in patients with pulmonary disease and anemia. Alcohol, aminosalicylic acid, neomycin, and colchicine may decrease the absorption of oral vitamin B_{12}.

NURSING PROCESS

The Patient Receiving a Drug Used in the Treatment of Anemia

ASSESSMENT

Preadministration Assessment

The nurse obtains a general health history and asks about the symptoms of the anemia. The primary health care provider may order laboratory tests to determine the type, severity, and possible cause of the anemia. At times, it may be easy to identify the cause of the anemia, but there are also instances where the cause of the anemia is obscure.

The nurse takes the vital signs to provide a baseline during therapy. Other physical assessments may include the patient's general appearance and, in the severely anemic patient, an evaluation of the patient's ability to carry out the activities of daily living. General symptoms of anemia include fatigue, shortness of breath, sore tongue, headache, and pallor.

If iron dextran is to be given, an allergy history is necessary because this drug is given with caution to those with significant allergies or asthma. The patient's weight and hemoglobin level are required for calculating the dosage.

Ongoing Assessment

During the ongoing assessment the nurse takes the vital signs daily; more frequent monitoring may be needed if the patient is moderately to acutely ill or if the patient is taking epoetin alfa (because of the increased risk of hypertension). The nurse monitors the patient for adverse reactions and reports any occurrence of adverse reactions to the primary health care provider before the next dose is due. However, the nurse immediately reports severe adverse reactions.

When the patient is receiving iron salt therapy, the nurse informs the patient that the color of the stool will become darker or black. If diarrhea or constipation occurs, the nurse notifies the primary health care provider.

If iron dextran is administered, the nurse informs the patient that soreness at the injection site may occur. Injection sites are checked daily for signs of inflammation, swelling, or abscess formation.

The nurse assesses the patient for relief of the symptoms of anemia (fatigue, shortness of breath, sore tongue, headache, pallor). Some patients may note a relief of symptoms after a few days of therapy. Periodic laboratory tests are necessary to monitor the results of therapy.

Nursing Alert

When monitoring the patient taking epoetin, the nurse reports any increase in the hematocrit of 4 points within any 2-week period because an exacerbation of hypertension is associated with an excessive rise of hematocrit. Hematocrit is decreased by decreasing or withholding the epoetin alfa dose.

NURSING DIAGNOSES

Drug-specific nursing diagnoses are highlighted in the Nursing Diagnoses Checklist. Other nursing diagnoses applicable to these drugs are discussed in depth in Chapter 4.

PLANNING

The expected outcomes for the patient may include an optimal response to therapy, management of constipation, adequate nutritional status, and an understanding of and compliance with the prescribed treatment regimen.

IMPLEMENTATION

Promoting an Optimal Response to Therapy

IRON. Iron salts are preferably given between meals with water but can be given with food or meals if gastrointestinal upset occurs. If the patient is receiving other drugs, the nurse checks with the hospital pharmacist regarding the simultaneous administration of iron salts with other drugs.

Oral iron solutions may cause temporary staining of the teeth. The solution is diluted with 2 to 4 oz of water or juice and drunk through a straw. The stool may appear darker or black; this is a normal occurrence and not a reason for concern.

Iron dextran is given via the IM or IV route. Before iron dextran is administered, a test dose may be done by

Nursing Diagnoses Checklist

- ✓ **Altered Nutrition: Less than Body Requirements** related to lack of iron, folic acid, other (specify) in the diet
- ✓ **Constipation** related to adverse reaction to iron therapy

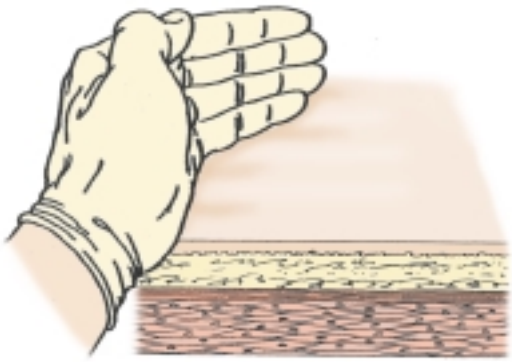
Draw up an additional 0.2 mL of air within the syringe.

Attach a needle that is at least 1½ to 2 inches long.

Don gloves.

Position the client on the abdomen or side depending on which injection site is used.

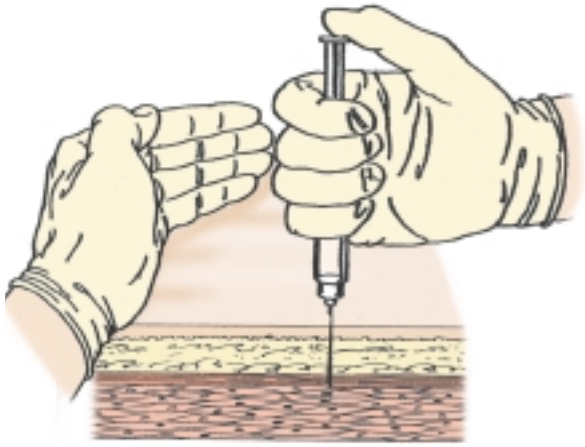
Using the side of your hand, pull the tissue laterally about 1 inch (2.5 cm) until it is taut.



Swab the site with an alcohol pledget.

Insert the needle at a 90-degree angle while continuing to hold the tissue laterally.

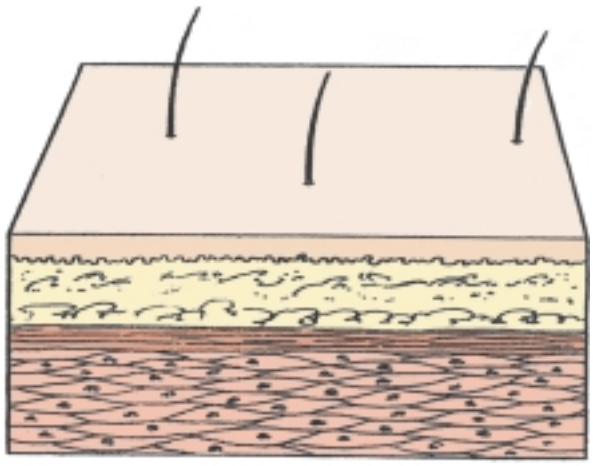
Steady the barrel of the syringe with the fingers and use the thumb to manipulate the plunger.



Aspirate for a blood return.

Instill the medication by depressing the plunger with the thumb.

Wait 10 seconds with the needle in place and the skin still held taut.



Withdraw the needle and immediately release the taut skin.

Apply direct pressure to the injection site with a gauze square, but do not rub it.

Cover the injection site with a Band-Aid.

Discard the syringe without recapping the needle.

Remove your gloves and wash your hands.

Document the medication administration.

FIGURE 45-1. Administering iron dextran using the Z-track technique.

administering 0.5 mL of iron dextran IV at a gradual rate during a period of 30 seconds or more. A test dose is also performed before administering the first dose of iron dextran IM by injecting 0.5 mL into the upper outer quadrant. The nurse monitors the patient for an allergic response for at least 1 hour after the test dose and before administering the remaining dose.

After the test dose, the prescribed dosage of iron is administered IM. The drug is given into the muscle mass of the upper outer quadrant (never into an arm or other area) using the Z-track method (see Fig. 45-1) to prevent leakage into the subcutaneous (SC) tissue. A large-bore needle is required. If the patient is standing, have the patient place weight on the leg not receiving the injection.

EPOETIN ALFA. When epoetin alfa is administered to a patient with hypertension, the nurse monitors the blood pressure closely. The nurse reports any rise in the systolic

or diastolic pressure of 20 mm Hg or more to the primary health care provider. The hematocrit is usually measured before each dose during therapy with epoetin alfa.

The drug is given three times weekly IV or SC, or if the patient is receiving dialysis, the drug is administered into the venous access line. The drug is mixed gently during preparation for administration. Shaking may denature the glycoprotein. The vial is used for only one dose; any remaining or unused portion is discarded.

Nursing Alert

This drug is not used for treatment of severe anemia or as a substitute for emergency transfusion. However, supplemental iron may be ordered during therapy with epoetin.

LEUCOVORIN. When leucovorin is administered after a large dose of methotrexate, the timing of the administration is outlined by the primary health care provider. It is essential that the leucovorin be given at the exact time ordered because the purpose of folinic acid rescue is to allow a high dose of a toxic drug to remain in the body for only a limited time.

VITAMIN B_{12}. Patients with pernicious anemia are treated with vitamin B_{12} by the parenteral route (IM) weekly stabilized. The parenteral route is used because the vitamin is ineffective orally due to the absence of the intrinsic factor in the stomach, which is necessary for utilization of vitamin B_{12}. After stabilization, maintenance (usually monthly) injections are necessary for life.

Monitoring and Managing Adverse Reactions

When the patient is receiving iron dextran, the nurse monitors closely for a hypersensitivity reaction. Epinephrine is kept on standby in the event of severe anaphylactic reaction.

Nursing Alert

Parenteral iron has resulted in fatal anaphylactic-type reactions. The nurse reports any of the following adverse reactions: dyspnea, urticaria, rashes, itching, and fever.

MANAGING CONSTIPATION. Constipation may be a problem when a patient is taking oral iron preparations. The nurse instructs the patient to increase fluid intake to 10 to 12 glasses of water per day (if the condition permits), eat a diet high in fiber, and increase activity. An active lifestyle and regular exercise (if condition permits) help to decrease the constipating effects of iron. If constipation persists, the primary health care provider may prescribe a stool softener.

MAINTAINING ADEQUATE NUTRITION. A special diet (eg, foods high in iron or foods high in folic acid) may be prescribed. If the diet is taken poorly, the nurse notes this on the patient's chart and discusses the problem with the primary health care provider.

The nurse recommends a balanced diet with an emphasis on foods that are high in iron (eg, organ meats, lean red meats, cereals, dried beans, and leafy green vegetables), folic acid (eg, green leafy vegetables, liver, and yeast) or vitamin B_{12} (eg, beef, pork, organ meats, eggs, milk, and milk products). The nurse monitors the amount of food eaten at meals. If appetite is poor or eating is inadequate to maintain normal nutrition, a consult with the dietitian may be necessary. Small portions of food may be more appealing than large or moderate portions. The nurse provides a pleasant atmosphere and allows ample time for eating.

Educating the Patient and Family

The nurse explains the medical regimen thoroughly to the patient and family and emphasizes the importance of following the prescribed treatment regimen. The nurse includes the following points in a patient and family teaching plan:

IRON SALT

- Take this drug with water on an empty stomach. If gastrointestinal upset occurs, take the drug with food or meals.
- Do not take antacids, tetracyclines, penicillamine, or fluoroquinolones at the same time or 2 hours before or after taking iron without first checking with the primary health care provider.
- This drug may cause a darkening of the stools, constipation, or diarrhea. If constipation or diarrhea becomes severe, contact the primary health care provider.
- Mix the liquid iron preparation with water or juice and drink through a straw to prevent staining of the teeth.
- Avoid the indiscriminate use of advertised iron products. If a true iron deficiency occurs, the cause must be determined and therapy should be under the care of a health care provider.
- Have periodic blood tests during therapy to determine the therapeutic response.
- Patients with rheumatoid arthritis may experience an acute exacerbation of joint pain, and swelling may occur with iron dextran therapy.

EPOETIN ALFA

- Keep all appointments with the primary health care provider. The drug is administered three times per

week (via the SC or IV route or via a dialysis access line). Periodic blood tests are performed to determine the effects of the drug and to determine dosage.
- Strict compliance with antihypertensive drug regimen is important in patients with known hypertension during epoetin therapy.
- Report numbness, tingling of extremities, severe headache, dyspnea, or chest pain. Joint pain may occur but can be controlled with analgesics.

FOLIC ACID

- Avoid the use of multivitamin preparations unless such use has been approved by the primary health care provider.
- Follow the diet recommended by the primary health care provider because diet and drug are necessary to correct a folic acid deficiency.

EPOETIN ALFA

- The drug will be administered three times weekly and can be given only via the IV or SC route or via venous access during dialysis.
- Keep appointments for blood testing, which is necessary to determine the effects of the drug on the blood count and to determine dosage.
- The following adverse reactions may occur: dizziness, headache, fatigue, joint pain, nausea, vomiting, or diarrhea. Report any of these reactions.

LEUCOVORIN

- Megaloblastic anemia—Adhere to the diet prescribed by the primary health care provider. If the purchase of foods high in protein (which can be expensive) becomes a problem, discuss this with the primary health care provider.
- Folinic acid rescue—Take this drug at the exact prescribed intervals. If nausea and vomiting, occur, contact the primary health care provider immediately.

VITAMIN B_{12}

- Nutritional deficiency of vitamin B_{12}—Eat a balanced diet that includes seafood, eggs, meats, and dairy products.
- Pernicious anemia—Lifetime therapy is necessary. Eat a balanced diet that includes seafood, eggs, meats, and dairy products. Avoid contact with infections, and report any signs of infection to the primary health care provider immediately because an increase in dosage may be necessary.
- Adhere to the treatment regimen and keep all appointments with the clinic or primary health care provider. The drug is given at periodic intervals (usually monthly for life). In some instances, parenteral self-administration or parenteral administration by a family member is allowed (instruction in administration is necessary).

EVALUATION

- The therapeutic effect of the drug is achieved.
- The patient has normal bowel movements.
- An adequate nutritional intake is achieved.
- The patient and family demonstrate an understanding of the drug regimen.
- The patient verbalizes the importance of complying with the prescribed treatment regimen.

● *Critical Thinking Exercises*

1. *Ms. Clepper, age 32 years, has received a diagnosis of pernicious anemia. Although the primary health care provider has explained the diagnosis and the treatment, the patient is confused and frightened. She questions you stating, "I just don't understand what is happening in my body to cause me to feel so weak and tired. How is the treatment going to work?" Discuss ways in which you would handle this situation with Ms. Clepper. Determine what to tell her that would decrease her anxiety and increase her understanding.*
2. *Mr. Garcia, age 54 years, has chronic renal failure. He undergoes dialysis three times a week. The physician orders epoetin alfa to be administered. Discuss the preadministration and ongoing assessments for Mr. Garcia. During a discussion with you, Mr. Garcia asks why he is receiving this drug. Discuss how you would answer Mr. Garcia's question.*

● *Review Questions*

1. Which is the most common type of anemia?
   - **A.** Iron deficiency anemia
   - **B.** Folic acid anemia
   - **C.** Pernicious anemia
   - **D.** Megaloblastic anemia
2. Which of the following substances would decrease the absorption of oral iron?
   - **A.** Antacids
   - **B.** Levothryoxine
   - **C.** Ascorbic acid
   - **D.** Vitamin B_{12}
3. Folic acid and leucovorin are contraindicated in which of the following conditions?
   - **A.** Hypothyroidism
   - **B.** Hyperthyroidism
   - **C.** Pernicious anemia
   - **D.** Pregnancy

4. When monitoring a patient taking epoetin alfa, which of the following lab results would be most important for the nurse to report immediately?
   - **A.** Any increase in hematocrit of 4 points within a 2-week period
   - **B.** Any increase in hematocrit of 2 points within a 2-week period
   - **C.** A daily change in the hematocrit of 1 point or more
   - **D.** A stabilization in the hematocrit in any 2-day period

5. When teaching a patient about the use of vitamin B_{12} for pernicious anemia, the nurse would include which of the following statements?
   - **A.** Take the oral form of vitamin B_{12} daily at bedtime on an empty stomach.
   - **B.** Take the oral form of vitamin B_{12} when you begin to feel weak or experience a headache.
   - **C.** You will require vitamin B_{12} injections monthly for life.
   - **D.** You will require vitamin B_{12} injections every 2 weeks until remission occurs.

● *Medication Dosage Problems*

1. The physician prescribes 25 mg iron dextran IM. The drug is available in a vial with 50 mg/mL. The nurse administers _____.

2. Folvite (folic acid) 1 mg SC is prescribed. The drug is available in a vial with 5 mg/mL. The nurse administers _____.