adhere to the area and eventually form a platelet plug to decrease bleeding.

2. Thrombocytosis refers to a marked, abnormal increase in the number of thrombocytes; thrombocytopenia refers to a marked, abnormal decrease in the number of thrombocytes.

G. Blood classification.
1. Major blood groups: A, B, AB, and O.
2. Rh factor may be present (positive) or absent (negative).
   a. Rh factor is present on the red blood cell.
   b. Rh-positive factor is present in 85% to 95% of the population.

---

**Anemias**

Anemia is characterized by a low RBC count and a decrease to below normal in hemoglobin and hematocrit values. The more rapidly an anemia occurs, the more severe the symptoms will be.
A. Common goal in treatment of all anemias is to identify the origin and correct the problem.

B. Data Collection.
   a. Pale skin, delayed wound healing.
   b. Shortness of breath, dyspnea on exertion, tachypnea.
   c. Tachycardia, palpitations, postural hypotension.
   d. Chronic fatigue, weakness, and apathy.
   e. Anorexia, nausea, weight loss.
   f. Chronic anemia may result in growth retardation in infants and children.

   TEST ALERT: Identify client’s ability to maintain activities of daily living.

C. Iron deficiency anemia: characterized by inadequate intake of dietary iron or excessive loss of iron.
   1. Common in adolescents; occurs in infants whose primary diet is milk.
   2. May occur in pregnancy or with heavy flow during menses.
   3. Older adults are more prone because of poor dietary iron intake and decreased absorption in the small intestines.
   4. Pallor, glossitis, cheilitis (inflammation of the lips)—three most common findings.
   5. Diagnostics: decreased hemoglobin and hematocrit values (Appendix 9-1).
   6. Treatment: supplemental iron intake (see Appendix 9-2).
      a. Increased dietary iron intake (see Table 2-2).
      b. Supplemental folic acid.

<table>
<thead>
<tr>
<th>Assessment Area</th>
<th>Hematologic System Findings</th>
<th>Older Adult Changes and Significance</th>
<th>TEST ALERT: Evaluate client’s nutritional status; adapt a diet to meet special needs of the client; evaluate impact of condition on nutritional status.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nail beds (check for capillary refill)</td>
<td>Pallor, cyanosis, and decreased capillary refill are often noted in hematologic disorders.</td>
<td>• Nails are typically thickened and discolored.</td>
<td></td>
</tr>
<tr>
<td>Hair distribution</td>
<td>Thin or absent hair on trunk and extremities may indicate poor oxygenation and blood supply to area.</td>
<td>• Older adults are losing body hair, but often in an even pattern distribution that has occurred slowly over time.</td>
<td></td>
</tr>
<tr>
<td>Skin moisture and color</td>
<td>Skin dryness, pallor, and jaundice may occur with anemia, leukemia, etc.</td>
<td>• Dry skin is a normal aspect of aging and thus becomes an unreliable indicator of skin moisture.</td>
<td></td>
</tr>
</tbody>
</table>

D. Pernicious anemia: condition characterized by an inability to absorb vitamin B₁₂ (cobalamin). It may be associated with loss of intrinsic factor (gastric resection), or it may be an autoimmune problem.
   1. Generally not associated with inadequate dietary intake.
   2. More common in older adult; most common age at diagnosis is 60 years.
   3. May be precipitated by gastric resection, gastritis, or chronic alcoholism.
   4. General symptoms of anemia, confusion.
   5. Paresthesia in the extremities, weakness, reduced vibratory sense.
   6. Smooth, beefy, red tongue (glossitis).
   7. Treatment: injections of vitamin B₁₂ may be required indefinitely.

E. Aplastic anemia: characterized by deficiency of the bone marrow in production of all blood cell types—RBCs, WBCs, and platelets.
   1. May be precipitated by chemotherapeutic agents, radiation, and anticonvulsant medications (e.g., Dilantin).
   2. Can result from radiation therapy.
   3. General symptoms of anemia.
   4. Fever.
   5. Infections associated with neutropenia.
7. Treatment:
   a. Hematopoietic stem cell transplant (see Appendix 9-4).
   b. Immunosuppressive medications.
F. Folic acid deficiency anemia: associated with decreased dietary intake of folic acid.
   1. Caused by alcoholism, anorexia, malabsorption syndromes.
   2. Deficiency may occur with increased demands for folic acid: infancy, adolescence, and pregnancy.
   3. May appear ill with malnourishment.
   4. Treatment: folic acid injections may be necessary initially; then oral replacement.

**Nursing Interventions**

*For all clients with anemia.*

- **Goal:** To assist in establishing a diagnosis.
  A. Complete nutritional evaluation.
  B. History of possible causes.
- **Goal:** To decrease body oxygen needs.
  A. Assess client’s tolerance to activity.
  B. Provide diversional activities but also provide for adequate rest.
  C. May need supplemental oxygen.
- **Goal:** To prevent infections.
  A. Decrease exposure.
  B. Evaluate for temperature elevations frequently.
  C. Observe for leukocytosis.
  D. Maintain adequate hydration.
- **Goal:** To assess for complications of chronic anemic state.
  A. Evaluate ability of cardiovascular system to maintain adequate cardiac output.
  B. Evaluate for symptoms of hypoxia (see Chapter 10).
- **Goal:** To help client understand implications of disease and measures to maintain health.
  A. Explain medical regimen.
  B. Discuss importance of continuing medical follow-up.
  C. Explain side effects of medications.
  D. Identify foods high in iron and folic acid (see Chapter 2).

---

**Sickle Cell Anemia**

- Sickle cell anemia is a problem characterized by the sickling effect of the erythrocytes, an inherited autosomal recessive disorder.

A. Sickle cell anemia is a problem characterized by the sickling effect of the erythrocytes, an inherited autosomal recessive disorder.

B. Predominantly a problem of children and adolescents. Child may be asymptomatic between crises. The problems from childhood may cause long-term complications as they become adults.

C. Pathologic changes of sickle cell disease result from:
   1. Increased blood viscosity.
   2. Increased RBC destruction.
   3. Increased viscosity eventually precipitates ischemia and tissue necrosis caused by capillary stasis and thrombosis.
   4. Cycle of occlusion, ischemia, and infarction to vascular organs.

D. Conditions precipitating sickling effect (Figure 9-1).
   1. Dehydration, acidosis.
   2. Hypoxia, infection with temperature elevation.

**Data Collection**

A. Splenomegaly, liver failure, hepatomegaly.
B. Kidney damage caused by the congestion of glomerular capillaries and tubular arterioles.
C. Vaso-occlusive crisis: blood flow is impaired by sickled cells, causing ischemia and pain.
   1. Extremities - occlusions in the small distal bones of the hands and the feet, characterized by pain, swelling, and decreased function (hand-foot syndrome).
   4. Renal – hematuria.
   5. CNS – stroke, visual problems.

**NURSING PRIORITY:** Recognize occurrence of a hemorrhage. Bleeding in a client with sickle cell anemia produces different symptoms than bleeding in a client who has undergone surgery; plan and implement nursing care to prevent complications; notify health care provider regarding signs of potential complications.

D. Diagnostics (see Appendix 9-1): early diagnosis, before 3 months of age, helps to minimize complications.
Treatment

A. Prevention of the sickling problem.
   1. Adequate hydration.
   2. Prevent infections, especially respiratory tract infections; pneumococcal vaccine is recommended.
   3. Clients generally do not require iron because of increased resorption.
   4. Daily folic acid supplement.
   5. Oxygen – assists to prevent a crisis in client with respiratory problems, but it does not reverse a sickling crisis or reduce pain.

B. Treatment of crisis.
   1. Bed rest, hydration, antibiotics.
   2. Analgesics for pain; promote adequate oxygenation.
   3. Blood transfusions and/or exchange transfusions (see Appendix 9-3).

C. Surgery: splenectomy.

Nursing Interventions

- **Goal:** To help client understand implications of the disease and long-term health care needs (i.e., prevention of DVT).
  - A. Participate in community screening programs and education.
  - B. Refer persons who are carriers (autosomal recessive trait) for genetic counseling.

- **Goal:** To prevent sickling crisis.
  - A. Maintain adequate hydration; intravenous (IV) fluids may be necessary.
  - B. Promote respiratory health and tissue oxygenation.
  - C. Prevent infection.
  - D. Hydroxyurea (Droxia, Hydrea): reduces sickling episodes, a long-term complication of leukemia.

- **Goal:** To control pain.
  - A. Assessment of involved area.
  - B. Administer appropriate analgesics.
  - C. Allow client to assume a position of comfort; passive range of motion may be beneficial.
  - D. Maintain rest if movement exacerbates pain.

- **Goal:** To maintain adequate hydration and oxygenation.
  - A. Evaluate adequacy of hydration.
  - B. Monitor IV fluid administration carefully; maintain accurate intake and output records.
  - C. Evaluate electrolyte balance.
  - D. Administer oxygen as indicated.
  - E. Provide good pulmonary hygiene.

Home Care

- A. Increase fluids with physical activity.
- B. Seek early intervention for symptoms of infection, especially respiratory tract infection; report temperature elevations, coughing, or pain.
- C. Encourage normal growth and developmental activities as tolerated by the child.
- D. Client with sickle cell disease should avoid situations that may precipitate hypoxia.

E. Inform all significant health care personnel that child should wear medical identification.

**Polycythemia Vera (Primary)**

- Polycythemia vera is a chronic disorder characterized by a proliferation of all red marrow cells due to a chromosomal mutation.

Data Collection

A. Usually occurs during middle age; median age is 60 years.
B. Early signs: headache, vertigo, tinnitus, pruritus.
C. Ruddy complexion (plethora).
D. Problems of decreased blood flow.
   1. Angina, claudication (pain in muscles during activity).
   2. Thrombophlebitis, hypertension.
E. Complication: stroke secondary to thrombosis.

Treatment

A. Phlebotomy (2-3 times per week initially, then every 2-3 months).
B. Myelosuppressive agents.

Nursing Interventions

- **Goal:** To help client understand implications of the disease and long-term health care needs (i.e., prevention of DVT).
  - A. Participate in community screening programs and education.
  - B. Refer persons who are carriers (autosomal recessive trait) for genetic counseling.

- **Goal:** To prevent sickling crisis.
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  - C. Evaluate electrolyte balance.
  - D. Administer oxygen as indicated.
  - E. Provide good pulmonary hygiene.

Leukemia

- Leukemia is an uncontrolled proliferation of abnormal white blood cells; eventual cellular destruction occurs as a result of the infiltration of the leukemic cells into the body tissue.

A. Three primary consequences of leukemia.
   1. Anemia from RBC destruction and bleeding.
   2. Infection associated with neutropenia.
   3. Bleeding tendencies caused by decreased platelets.

B. Types of leukemia.
   1. Acute lymphocytic leukemia (blast or stem cell) (ALL).
      a. Peak occurrences: around 4 years of age, then again around 65 years.
      b. Favorable prognosis with chemotherapy.
      c. Leukemic cells will infiltrate the meninges, precipitating increased intracranial pressure.
      a. Most common in older adults.
      b. Peak incidence age 60 to 70 years.
   3. Chronic myelogenous leukemia (CML).
      a. Uncommon before the age of 20 years; peak incidence age 45 years.
b. Onset is generally slow.
c. Symptoms are less severe than those in acute stages of disease.
d. Presence of Philadelphia chromosome in 90% of cases.

4. Chronic lymphocytic leukemia (CLL).
a. Common malignancy of older adults; rare before age 30, and more common in men.
b. Frequently asymptomatic; often diagnosed in a chronic fatigue work-up.

Data Collection
A. Clinical manifestations.
   1. Anemia, infection, and bleeding tendencies occurring together.
   2. Anorexia, weight loss, cough.
   3. Central nervous system involvement: headache, confusion, increased irritability.
   4. Fatigue, lethargy.
   5. Petechiae, bruises easily, epistaxis.
   7. Hepatomegaly and splenomegaly.
B. Diagnostics (see Appendix 9-1): bone marrow aspiration to evaluate cell production.

Treatment
A. Medications.
   1. Corticosteroids and antineoplastic agents.
   2. Allopurinol (Zyloprim) decreases uric acid levels in clients receiving chemotherapy.
B. Hematopoietic stem cell transplantation (see Appendix 9-4).
C. A remission is characterized by absence of leukemic cells and disappearance of all disease symptoms.

Nursing Interventions
✓ Goal: To prevent infection.
A. Assess for evidence of infection: fever, inflammation, pain.
B. Monitor temperature elevation closely; notify doctor of increase above 100.5°F (38°C).
C. Meticulous skin care, especially oral hygiene and around perianal area.
D. Protect client from exposure to infection; degree of restriction depends on immunosuppression.
E. Isolate client from persons with communicable childhood diseases, especially those with chicken pox.
F. Polio (IPV), varicella, measles-mumps-rubella, and influenza immunizations are not recommended to be given to children or adults during immunosuppression.
G. Avoid urinary catheterization if possible.
H. Encourage adequate protein and calorie intake, low-bacteria diet.
I. Maintain adequate hydration.

BOX 9-1 BLEEDING PRECAUTIONS

Indications: Clients diagnosed with leukemia, hemophilia, or any condition that causes bleeding; clients receiving anticoagulants or thrombolytic medications.
• Limit number of venipunctures and intramuscular injections.
• Perform guaiac tests on stool as necessary.
• Oral hygiene:
  ✦ Discourage flossing.
  ✦ Use soft toothbrush or no toothbrush; may need to use cotton-tipped swabs while gums are friable.
  ✦ Avoid harsh mouthwashes.
  ✦ Rinse mouth frequently with mild mouthwash.
• Use electric razor for shaving.
• Assess perianal area for fissures and bleeding daily.
• Discourage client from vigorous coughing or nose blowing.
• Avoid aspirin products; evaluate NSAIDs for bleeding properties.
• Avoid catheters (urinary and suctioning) when possible.
• Avoid enemas and suppositories.
• Avoid overinflation of blood pressure cuff or leaving cuff inflated for prolonged period of time.
• Provide safe environment and prevent injury according to age (padded side rails, soft toys, house shoes, etc.).
• Monitor for bleeding episode: nosebleed, hematuria, in creased bruising.

NSAIDs, Nonsteroidal antiinflammatory drugs.

✓ NURSING PRIORITY: Identify symptoms of infection and treatment of common infections is a priority in the care of this client.
\[\text{Goal:} \text{To prevent or limit bleeding episodes (Box 9-1).}\]
A. Use local measures to control bleeding (pressure to area; cold packs).
B. Restrict strenuous activity.
C. Involve client in evaluating level of activity; decrease activity when platelet counts are low and anemia is present.
\[\text{Goal:} \text{To provide pain relief.}\]
A. Use acetaminophen rather than aspirin.
B. Maintain environment conducive to rest.
C. Position carefully; may coordinate positioning with administration of analgesics.
D. Evaluate effectiveness of pain relief; administer analgesic before pain becomes severe.
E. Do not exercise affected joints.
\[\text{Goal:} \text{To decrease adverse effects of chemotherapy (see Table 2-4).}\]
\[\text{Goal:} \text{To prevent complications of transfusions (see Appendix 9-3).}\]
**Lymphomas**

* Characterized by malignant neoplasms originating in the bone marrow and lymphocytes. Lymphoma is the fifth most common type of cancer in the U.S.

A. **Hodgkin’s disease:** characterized by painless enlargement of lymph nodes with progression to involve the liver and spleen. Common metastatic sites are the spleen, liver, bone marrow, and lungs. Disease is spread by extension along the lymphatic system. This is the most curable of the lymphomas.
   1. Increased incidence in immunosuppressed clients.
   2. Initially, painless enlargement of cervical, axillary, inguinal, or mediastinal lymph nodes.
   3. Fever, malaise, night sweats.
   4. Weight loss and fatigue are associated with a poor prognosis.
   5. Treatment: chemotherapy and radiation.

B. **Non-Hodgkin’s lymphoma:** a neoplastic growth that originates in the lymphoid tissue. It spreads malignant cells unpredictably, infiltrating the lymphoid tissue.
   1. Increased incidence in clients with immunodeficiency or autoimmune conditions who have used immunosuppressant medications.
   2. Symptoms are highly variable, depending on where the disease has spread.
   3. Treatment: chemotherapy and radiation.

**Nursing Interventions**

- **Goal:** To maintain physiologic equilibrium.
  A. Maintain hydration and nutrition.
  B. Maintain good pulmonary hygiene.
  C. Evaluate for shortness of breath; maintain in semi-Fowler’s position.
  D. Decrease body needs for oxygen.
  E. Assess ability of cardiovascular system to maintain cardiac output.
  F. Manage pain and effects of therapy.
- **Goal:** To prevent infection (see “Goal: To prevent infection” in Leukemia section above).
- **Goal:** To decrease adverse effects of chemotherapy and radiation therapy (see Table 2-4).

**Hemophilia**

* Hemophilia is a defect in the clotting mechanism. The disease is most often recognized during the toddler stage.

**Data Collection**

A. Hemophilia is a sex-linked recessive disorder.
   1. Primarily affects males.
   2. Females are carriers.
B. Persistent or prolonged bleeding that occurs from minor trauma/insults.
C. Hemarthrosis: bleeding into joint cavities.
D. Spontaneous hematuria
E. Hematoma.
F. Intracranial hemorrhage may be fatal.
G. Petechiae are uncommon, because platelet count is normal.

**Treatment**

A. **Factor VIII concentrate:** must be reconstituted with sterile water immediately before administration; given IV push over 5-10 minutes.
B. **Desmopressin (DDAVP, Stimate):** synthetic vasopressin used to treat mild cases; given IV or intranasal.
C. Treatment may be carried out at home.

**Nursing Interventions**

- **Goal:** To prevent spontaneous bleeding episodes (see Box 9-1).
  A. Decrease risk for injury.
     1. Make environment as safe as possible without hampering motor development.
     2. Instruct client to avoid contact sports, but encourage noncontact sports (e.g., swimming).
     3. Regular exercise and physical therapy to promote muscle strength around joints and decrease bleeding episodes.
  B. Preventive dental care, and prevent oral infections.
  C. Maintain normal weight; increased weight causes increased strain on the joints.
  D. Avoid any aspirin compounds.
  E. Administer clotting factors before, during, and after invasive medical procedures.

- **Goal:** To recognize and treat bleeding episodes.
  A. Apply pressure to the area.
  B. Immobilize and elevate the joints involved.
  C. Do not perform passive range of motion on affected joints.
  D. Apply cold pack to promote vasoconstriction.
  E. Observe for signs of internal bleeding: tarry stools, slurred speech, headache.
  F. Administer clotting factors in a timely manner.

- **Goal:** To prepare client and family to administer clotting factors intravenously at home.
  A. Correct technique for venipuncture.
  B. Indications for use.
  C. Encourage child to learn self-administration, generally around age 9 to 12 years.

- **Goal:** To prevent permanent joint degeneration.
  A. Elevate joint and immobilize during acute bleeding episode.
  B. Encourage active range of motion so child will limit movement based on pain tolerance.
  C. Physical therapy after the acute phase, no weight bearing until swelling has resolved.
  D. Maintain pain relief during physical therapy.
NURSING PRIORITY: Apply RICE to the affected joints: rest, ice, compression, elevation.

Disseminated Intravascular Coagulation

Disseminated intravascular coagulation is a secondary coagulation disorder involving widespread clotting in the small vessels, leading to consumption of clotting factors, thereby precipitating a bleeding disorder. It is not a disease but a result of underlying conditions.

Data Collection

A. Caused by hemolytic processes, extensive tissue damage, shock, sepsis, burns.
B. Petechiae, ecchymosis on skin and mucous membranes are noted.
C. Prolonged bleeding from multiple body areas.
D. Hypotension leading to shock.
E. Multiple organ dysfunction syndrome.

Treatment

A. Correction of the underlying problem.

Nursing Interventions

Goal: To identify the problem early and to decrease potential adverse effects.

A. Thorough assessment of bleeding problems in clients severely compromised by other problems (shock and sepsis).
B. Nursing measures to prevent bleeding episodes (see Box 9-1).
C. Assess and support all vital systems.

Goal: To help the client’s family understand the implications of the disease and demonstrate appropriate coping behaviors.

A. Provide emotional support and encourage visiting as intensive care policies and client’s condition allow.
B. Encourage ventilation of feelings regarding critical illness of family member.
C. Be available to family members during visiting time.

Disorders of the Spleen

The spleen is affected by many disorders that can result in splenomegaly (enlarged spleen). The spleen usually contains 20 to 40 mL of blood and does not serve as a reservoir for blood volume or red blood cells.

Data Collection

A. Hypersplenism: splenomegaly with peripheral cytopenias (anemia, leukopenia, thrombocytopenia).
B. Pain due to splenomegaly.
C. Splenic rupture from trauma or inadvertent tearing during other surgical procedures.

Treatment

A. Splenectomy.
B. Analgesics for pain.
C. Platelets, fresh frozen plasma transfusions.

Nursing Interventions

Goal: To identify the problem early (splenomegaly, hypersplenism, or splenic rupture) and to decrease potential adverse effects.

A. Thorough assessment of spleen problem and management to address issues of splenomegaly (pain), hypersplenism, or splenic rupture (emergency surgery).
B. Nursing measures to prevent bleeding episodes in hypersplenism (see Box 9-1).
C. Assess and support all vital systems.
D. Monitor for complications following surgery—hemorrhage, shock, fever, abdominal distention, immunologic deficiencies, infection.

Goal: To help the client’s family to understand the implications of the problem and demonstrate appropriate coping behavior.

A. Provide emotional support and encourage visiting as intensive care policies and client’s condition allow.
B. Encourage ventilation of feelings regarding critical illness of family member.
C. Be available to family members during visiting time.
D. Teach about lifelong risk for infection following splenectomy; encourage vaccination for pneumococcus.
Study Questions: Hematologic System

1. The nurse is assessing a client who has been admitted for treatment of his leukemia. What nursing observation should be reported immediately?
   1. Swelling and bleeding into knees.
   2. Increased bruising.
   3. Nausea and vomiting.
   4. Oral temperature of 101˚F.
2. What nursing interventions would be important in the care of a client who has severe aplastic anemia? Select all that apply:
   1. Maintain warm environment.
   2. Plan all nursing activities early in morning to prevent fatigue.
   3. Evaluate client for tachycardia.
   4. Encourage diet that is high in iron and vitamin K.
   5. Encourage activity, especially ambulating 3 times a day.
3. An older client is being discharged after diagnosis and treatment for leukemia. What will be important to discuss with this client regarding home care?
   1. Maintain a diet that is low in protein and high in carbohydrates.
   2. It is important to regularly check temperature; call physician’s office if oral temperature is greater than 101˚F.
   3. Always thoroughly wash, cook, or peel fresh vegetables and fruits.
   4. Apply warm packs to joints to prevent further bleeding.
4. A client has developed aplastic anemia. What health problem in the client’s past would be associated with this condition?
   1. Hemorrhage and shock after surgery.
   2. Poor dietary intake of iron and folic acid.
   3. Treatment for a pulmonary malignancy.
   4. History of stomach resection and loss of intrinsic factor.
5. A 10-year-old client is admitted in a sickle cell crisis. What would the nurse anticipate to be a priority concern for nursing care?
   1. Pain management.
   2. Swollen, bleeding joints.
   3. Treatment of high temperature.
   4. Decreased bowel sounds.
6. A client is admitted with thrombocytopenia. What will the nurse implement to address this problem?
   1. Contact precautions.
   2. Increase fluid intake.
   3. Cold packs to the joints.
   4. Bleeding precautions.
7. The nurse would expect to find which symptoms in a client who has hemophilia?
   1. Muscle pain and vomiting.

2. Joint pain and bleeding.
   3. Nausea and fever.
   4. Petechiae and tachycardia.
8. A client is being treated with epoetin alfa (Epogen). The nurse would explain to the client that the purpose of the medication is to:
   1. Decrease the availability of prothrombin to decrease bleeding episodes.
   2. Enhance the effectiveness of the chemotherapy medications.
   3. Provide increased availability of iron.
   4. Increase production of red blood cells.
9. The nurse is caring for a client with a hemoglobin level of 8.2 gm/dl. What are important nursing measures?
   1. Increase fluids and ambulate 3 times a day.
   2. Assess for tachycardia; keep warm.
   3. Monitor for bleeding tendencies.
   4. Assess for bradycardia and fever.
10. A child is recovering from a sickle cell crisis. To promote health in this child after discharge, what is important for the nurse to discuss with the parents?
    1. Maintain good hydration status.
    2. Avoid active virus vaccinations.
    3. Avoid contact with peers.
    4. Increase intake of high-calorie foods.
11. Which client would the nurse identify as being at increased risk for development of an iron-deficiency anemia?
    1. An older client receiving radiation therapy weekly.
    2. A client with a history of peptic ulcer disease.
    3. A 2-year-old child with a high milk intake.
    4. A teenager in a sickle cell crisis.
12. A child has a severe laceration on his finger that is bleeding profusely. What is the best nursing action?
    1. Put an ice bag on the finger.
    2. Apply pressure at the site.
    3. Apply pressure at the brachial artery.
    4. Prepare an injection of vitamin K.
13. A client has been placed on bleeding precautions. What is important to include in the nursing care?
    1. Evaluate daily lab values to determine clotting factors.
    2. Discourage flossing and encourage use of a soft toothbrush.
    3. Encourage increased intake of iron-rich foods.
    4. Catheterize the client to determine renal bleeding.
14. The nurse is caring for an older client with leukemia. He is experiencing bleeding into his knees. What is the best nursing care regarding joint mobility and activity?
    1. Encourage walking around the unit every 2 hours.
    2. Gently move each leg through active range-of-motion exercises.
    3. Place warm packs on the joints to promote mobility.
    4. Keep the joints immobilized and maintain bed rest.
15. A client has been diagnosed with pernicious anemia. What will the nurse discuss with the client regarding the vitamin B\text{12} he will be prescribed when he is discharged?
   1. He will need to have monthly injections of vitamin B\text{12}.
   2. He will need to take the medication with milk.
   3. He should decrease his intake of leafy, green vegetables that are high in vitamin K.
   4. It will be important for him to have weekly lab studies to evaluate the medication.

16. A client is experiencing a problem with epistaxis. What is the first nursing action?
   1. Apply pressure to the nose and have the client lean forward.
   2. Hold the client’s head back and put ice on the nose.
   3. Position the client supine and check the blood pressure.
   4. Encourage clear liquids and observe for nausea.

Answers and rationales to these questions are in the section at the end of the book titled Chapter Study Questions: Answers and Rationales.

Appendix 9-1 HEMATOLOGIC DIAGNOSTICS

<table>
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<tr>
<th>TEST</th>
<th>NORMAL</th>
<th>CLINICAL AND NURSING IMPLICATIONS</th>
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| Bone marrow aspiration or biopsy          | All formed cell elements within normal range (erythrocytes, leukocytes, and platelets). | 1. Evaluates presence, absence, or ratio of cells characteristic of a suspected disease (e.g., hematopoiesis pathology, chromosomal abnormalities).
|                                           |                                                                       | 2. Preferable site is posterior iliac crest.                                                       |
|                                           |                                                                       | 3. Client preparation:                                                                           |
|                                           |                                                                       |   a. Local anesthetic is used, as well as analgesics or conscious sedation.                       |
|                                           |                                                                       |   b. Feeling of pressure when bone marrow is entered; pain occurs as marrow is being withdrawn. |
|                                           |                                                                       | 4. After test:                                                                                    |
|                                           |                                                                       |   a. Observe for bleeding at site.                                                                |
|                                           |                                                                       |   b. Apply pressure to site 5 to 10 minutes or longer if client is thrombocytopenic.               |
|                                           |                                                                       |   c. Bed rest for approximately 30 min afterward.                                                 |
|                                           |                                                                       |   d. Analgesics as indicated.                                                                     |
|                                           |                                                                       |   e. Monitor for infection.                                                                     |
| Sickle cell test (SICKLEDEX)              | No hemoglobin S present.                                              | 1. Routine screening test for sickle cell trait or disorder; does not distinguish between them.   |
|                                           |                                                                       | 2. False-negative result in infants less than 3 months.                                           |
|                                           |                                                                       | 3. False-positive result can occur for up to 4 months after a transfusion of RBCs that are positive for the trait. |

COMPLETE BLOOD COUNT

<table>
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<tr>
<th>TEST</th>
<th>NORMAL</th>
<th>CLINICAL AND NURSING IMPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platelets</td>
<td>150,000–400,000/mm\text{\textsuperscript{3}}</td>
<td>1. Decreased platelets (thrombocytopenia) associated with bleeding.</td>
</tr>
<tr>
<td>RBC count</td>
<td>4.0–6.0 million/mm\text{\textsuperscript{3}}</td>
<td>1. Decreased in clients with bone marrow depression and anemias.</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>Female: 12-16 g/dl</td>
<td>1. Components of the RBC responsible for oxygen transport.</td>
</tr>
<tr>
<td></td>
<td>Male: 14-18 g/dl</td>
<td>2. Decreased in anemias, chronic and acute blood loss, and bone marrow depression.</td>
</tr>
<tr>
<td></td>
<td>Newborn: 14-20 g/dl</td>
<td>3. An effective indicator of hydration status. An increase in hematocrit may be indicative of a decrease in fluid volume, resulting in hemo-concentration.</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>Female: 37%-47%</td>
<td>1. Values reflect the volume of RBCs found in 100 mL of whole blood.</td>
</tr>
<tr>
<td></td>
<td>Male: 40%-54%</td>
<td>2. Low levels in anemias, bone marrow depression.</td>
</tr>
<tr>
<td></td>
<td>Newborn: 52%-62%</td>
<td>3. An effective indicator of hydration status. An increase in hematocrit may be indicative of a decrease in fluid volume, resulting in hemo-concentration.</td>
</tr>
<tr>
<td>WBC count</td>
<td>Adults: 5000-10,000/mm\text{\textsuperscript{3}}</td>
<td>1. White blood cells are an important component in the body’s defense against infection.</td>
</tr>
<tr>
<td></td>
<td>Child (2 years): 6000-17,000/mm\text{\textsuperscript{3}}</td>
<td>2. Elevated levels (leukocytosis) are associated with infection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Decreased levels (leukopenia) are associated with diseases of the blood and bone marrow depression.</td>
</tr>
</tbody>
</table>
### Appendix 9-2  HEMATOLOGIC MEDICATIONS

<table>
<thead>
<tr>
<th>MEDICATIONS</th>
<th>SIDE EFFECTS</th>
<th>NURSING IMPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrous fumarate (Feostat, Span 77, FEM Iron): IM, PO</td>
<td>GI irritation</td>
<td>1. Absorbed better on empty stomach; however, may give with meals if GI upset occurs.</td>
</tr>
<tr>
<td>Ferrous gluconate (Fergon, Ferralet): PO</td>
<td>Nausea</td>
<td>2. Liquid preparations should be diluted and given through a straw to prevent staining of the teeth.</td>
</tr>
<tr>
<td>Ferrous sulfate (Feosol, Fer-In-Sol): PO</td>
<td>Constipation</td>
<td>3. Tell client stool may be black and iron may cause constipation.</td>
</tr>
<tr>
<td></td>
<td>Fever</td>
<td>5. Iron preparations inhibit oral tetracycline absorption. IM/IV preparations may be used if on oral tetracycline.</td>
</tr>
<tr>
<td></td>
<td>Urticaria</td>
<td>1. Anaphylactic reaction can occur; test dose should be given.</td>
</tr>
<tr>
<td>Vitamin K: phytonadione (AquaMEPHYTON): PO, subQ, IM, IV</td>
<td>GI upset, rash</td>
<td>2. IM should be avoided because of pain and tissue discoloration.</td>
</tr>
<tr>
<td></td>
<td>IV not recommended because of hypersensitivity reactions</td>
<td>3. If given IM, use Z-track method to prevent tissue staining.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. IV route recommended if oral route is not acceptable.</td>
</tr>
</tbody>
</table>

**GI**, Gastrointestinal; **IM**, intramuscularly; **IV**, intravenously; **PO**, by mouth (orally); **SQ**, subcutaneously.
Appendix 9-3    GUIDELINES FOR MONITORING BLOOD TRANSFUSIONS

General Nursing Implications

• The practical nurse should be familiar with the Nurse Practice Act of the individual state and hospital policies regarding the administration of blood and blood products.
• When blood is brought to the client care unit from the blood bank, it should be started immediately. Blood should never be stored in a unit refrigerator or allowed to sit at room temperature.
• Never add any medication to blood products or to the infusion line of a blood product.
• The usual rate of infusion in an adult is 1 unit of blood over 3 to 4 hours, depending on the condition of the client. The RN should set the initial rate.
• Determine if the client has a history of allergy, specifically a previous reaction to transfused blood.
• Baseline vital signs must be obtained immediately before starting the infusion. Notify the RN if the client’s temperature is above 101˚F or increases more than 2˚F, or if any other vital signs have changed significantly from previous readings. Check vital signs every hour during and 1 hour after transfusion.
• The client is most likely to experience a reaction during the first 50 mL of blood infused (approximately the first 15 minutes). Monitor for reaction.
• Blood deteriorates rapidly after exposure to room temperature. Blood should not hang longer than 4 hours.

TEST ALERT: Monitor the administration of blood or blood products.

<table>
<thead>
<tr>
<th>TYPE OF TRANSFUSION REACTION</th>
<th>NURSING MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hemolytic Transfusion Reaction</strong></td>
<td>1. Stop transfusion immediately and notify RN or physician.</td>
</tr>
<tr>
<td>1. Low back pain</td>
<td>2. Change the IV tubing; do not allow blood in the tubing to infuse into the client; maintain IV access.</td>
</tr>
<tr>
<td>3. Apprehension, sense of impending doom</td>
<td>4. Anticipate blood samples to be drawn by the lab.</td>
</tr>
<tr>
<td>4. Fever, chills, flushing</td>
<td>5. With suspected renal involvement, treatment with diuretics is initiated to promote diuresis.</td>
</tr>
<tr>
<td>5. Chest pain</td>
<td></td>
</tr>
<tr>
<td>6. Dyspnea</td>
<td></td>
</tr>
<tr>
<td>7. Onset is immediate</td>
<td></td>
</tr>
</tbody>
</table>

| **Allergic Reaction** | 1. If client has a history of allergic reactions, antihistamines may be given before starting the transfusion. |
| 1. Urticaria (hives) | 2. Stop transfusion until status of reaction can be determined by the RN or physician; if symptoms are mild and transient, the transfusion may be resumed. |
| 2. Pruritus | |
| 3. Facial flushing | |
| 4. Severe shortness of breath, bronchospasm | |

| **Febrile Reaction** | 1. Keep client covered and warm during transfusion. |
| 1. Chills and fever | 2. Stop the transfusion until status of reaction can be determined by the RN or physician. |
| 2. Headache, flushing | 3. Transfusion with leukocyte-poor RBCs or frozen washed packed cells may prevent this reaction in clients susceptible to fever. |
| 4. Increased anxiety | |
**Goal:** To restore hematologic and immunologic function in clients with immunologic deficiencies, leukemia, congenital or acquired anemias.

### PROCEDURE
In the adult client, approximately 400 to 800 mL of bone marrow or harvested stem cells are processed and transfused into the client. (See Appendix 9-1 for care of donor client for bone marrow aspiration.)

### COMPLICATIONS
1. Bacterial, viral, or fungal infection from immunosuppressed state.
2. Severe thrombocytopenia resulting in bleeding problems.
3. Rejection of the transplant.

### NURSING IMPLICATIONS
1. Preparation of the client for immunosuppression with chemotherapy and radiation therapy.
2. Successful engraftment is indicated by formation of erythrocytes, leukocytes, and platelets, usually 2 to 5 weeks after transplantation.
3. Care of the immunosuppressed client (see Chapter 2).

*Includes bone marrow transplant and stem cell transplant.*