Abnormal Cell Growth

CHARACTERISTICS OF CANCER

Cancer must be regarded as a group of disease entities with different causes, manifestations, treatments, and prognoses. The basic disease process begins when normal cells undergo change and begin to proliferate in an abnormal manner.

Major Dysfunction in the Cell

A. Cellular proliferation: cancer cells divide in an indiscriminate, unregulated manner and exhibit significant variations in structure and size.
B. Loss of contact inhibition: cells have no regard for cellular boundaries; normal cells respect boundaries and do not invade adjacent areas or organs.
C. Cancer can arise from any cell in the body that can evade the normal regulatory controls of proliferation or growth and cellular differentiation.
D. Cell biology.
   1. Predetermined means that the stem cell of specific tissue will differentiate and mature for only that tissue.
   2. A state of equilibrium is constantly being maintained between cellular proliferation and cellular degeneration.
   3. Cancer cells divide indiscriminately.
E. Tumors (neoplasms).
   1. Benign: encapsulated neoplasm that remains localized in the tissue of origin and is typically not harmful.
      a. Exerts pressure on surrounding organs.
      b. Will decrease blood supply to the normal tissue.
   2. Malignant: nonencapsulated neoplasm that invades surrounding tissue. Depends on the stage of the neoplasm as to whether metastasis (spreading to distant body parts) occurs. Four primary mechanisms by which the neoplasm spreads (Figure 8-1).
      a. Vascular system: cancer cells penetrate vessels and circulate until trapped. The cancer cells may penetrate the vessel wall and invade adjacent organs and tissues.
      b. Lymphatic system: cancer cells penetrate the lymphatic system and are distributed along lymphatic channels.
      c. Implantation: cancer cells implant into a body organ. Certain cells have an affinity for particular organs and body areas.
      d. Seeding: a primary tumor sloughs off tumor cells into a body cavity, such as the peritoneal cavity.
   3. Common sites for metastasis: brain, liver, lungs, spinal cord, and bone.

Etiology

A. Viruses: incorporate into the genetic structure of the cell causing mutations (e.g., Kaposi’s sarcoma from HIV; hepatitis B virus and hepatocellular cancer; human papilloma virus and cervical cancer).
B. Radiation: exposure to sunlight and radiation (bone cancer in radiologists; increased incidence of cancer in children who were exposed to radiation during fetal development).
C. Chemical agents: produce toxic effects by altering DNA structure in body cells (e.g., dyes, asbestos, tars, tobacco use, chronic irritation or inflammation); there may be an extended latency period from time of exposure to development of the cancer.
D. Genetic and familial factors: DNA damage occurs in cells where chromosomal patterns are abnormal, which increases the individual’s susceptibility to cancer.
E. Hormonal agents: tumor growth is promoted by disturbances in hormonal balance of the body’s own (endogenous) hormones or administration of exogenous hormones (e.g., prolonged estrogen replacement, oral contraceptives).
F. Idiopathic: many cancers—e.g., breast, colon, rectal, lymphatic, bone marrow, and pancreatic cancers—arise spontaneously from unknown causes.

Prevention

A. Cancer prevention.
   1. Eat a balanced diet that includes fresh fruits and vegetables, adequate amount of fiber, and decreased fats and preservatives; avoid smoked and salt-cured foods containing increased nitrates (see Figure 2-4).
   2. Avoid exposure to known carcinogens—e.g., cigarette smoking and sun exposure.
examination is an option for women in their 20s, but does not replace need for CBE or mammogram (see Chapter 22).

5. Testicular self-examination: monthly from age 20 to 40 (see Chapter 22).

**Classification of Malignant Tumors**

A. Cellular origin or anatomic classification: tumor is identified by the tissue of origin.

2. Connective tissue (-sarcoma): cartilage—chondrosarcoma; striated muscle bone—rhabdomyosarcoma; fibrous tissue—fibrosarcoma; bone—osteosarcoma.

B. TNM classification (staging) (Box 8-1).

**TREATMENT OF CANCER**

**Diagnostics**

A. Common cancer diagnostic studies.

2. Tissue biopsy.

B. Screening guidelines—early detection.

1. Pap test: screening should begin within 3 years of becoming sexually active or at age 21; thereafter should be done annually or every 2 years. Age 30, after 3 normal Pap tests, then Pap screening every 3-4 years.
2. Digital rectal examination (DRE): DRE with prostate-specific antigen blood test should be offered to men annually beginning at age 50. African-American males and those men with strong family history should begin at age 45.
3. Colon: beginning at age 50, all clients should have either a yearly fecal occult blood test or a flexible sigmoidoscopy every 5 years and/or both, depending on the client’s risk factors.
4. Breast: annual mammogram and clinical breast exam (CBE) for women over 40. Women ages 20-39 should have a CBE every 3 years. Monthly breast self-examination is an option for women in their 20s, but does not replace need for CBE or mammogram (see Chapter 22).

**Box 8-1 TNM STAGING CLASSIFICATION**

<table>
<thead>
<tr>
<th>T: Tumor size</th>
<th>N: Degree of involvement of lymph nodes</th>
<th>M: Absence or presence of metastasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX: Tumor can’t be measured or found</td>
<td>N0: Nearby lymph nodes do not contain cancer</td>
<td>M0: No known distant metastases</td>
</tr>
<tr>
<td>T0: No evidence of primary tumor</td>
<td>N1-N3: Describe the size, location, and/or the number of lymph nodes involved—the higher the N number, the more lymph nodes are involved</td>
<td>M1: Distant metastases present</td>
</tr>
<tr>
<td>Tis: Cancer is in situ (tumor has not started growing into the surrounding structures)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1-T4: Describe the size and/or level of invasion into nearby structures—the higher the T number, the larger the tumor and/or the further it may have grown into nearby structures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example:** Tis, NX, MO—cancer in situ; unable to clinically assess distant lymph nodes; no evidence of distant metastasis

5. Spiral computed tomography (CT).
6. Cytology studies (bone marrow aspiration, urine and cerebrospinal fluid analysis, cell washings, Pap smears and bronchial washings).
7. Position emission tomography (PET) scan.
8. Tumor markers.
9. Sigmoidoscopy or colonoscopy examinations—including stool for occult blood.
10. CBC, chemistry profile, liver function tests.
11. Bone marrow examination (if hematolymphoid malignancy is suspected).

**ALERT** Assist client in maintaining an optimum level of health; evaluate incorporation of healthy behaviors into lifestyle (screening, immunizations); instruct client on ways to promote health.

**B. Biopsy.**
1. Used for definitive diagnosis.
2. Needle: tissue samples are obtained by aspiration or with a large-bore needle.
3. Incisional: a scalpel or dermal punch is used to obtain a tissue sample.
5. Endoscopic biopsy: direct biopsy through an endoscopy of the area (gastrointestinal, respiratory, genito-urinary tracts).

**Goals of Cancer Therapy**
A. Prophylaxis: to provide treatment when no tumor is detectable but when client is known to be at risk for tumor development, spread, or recurrence.
B. Control: client’s cancer is not cured but controlled by therapy over long periods of time.
C. Cure: client will be disease-free and live to normal life expectancy.
D. Palliative: to maintain as high a quality of life for the client as possible when cure and control are not possible.

**Modalities of Cancer Treatment**

**1.** **NURSING PRIORITY** Therapy generally involves using two or more modalities of treatment.

**A. Surgery.**
1. Diagnostic surgery: obtains tissue samples (biopsies) for diagnostic purposes and to determine methods of treatment.
2. Clinical staging surgery: determines the extent of the cancer; presence and location of metastatic lesions.
3. Curative and/or control surgery: removal of cancers that are localized to the area of origin; extent of resection determined by the type and spread of tumor.
4. Palliative surgery: does not impair the growth or spread of the cancer but improves the client’s quality of life. May be done to relieve pain, decrease obstruction, relieve pressure, and/or to prevent hemorrhage.
5. Supportive care: surgeries to support cancer treatment (e.g. suprapubic cystostomy for prostate cancer, feeding tubes).
7. Preventive surgery: for clients who are in a high-risk category, certain surgical procedures may prevent the future development of cancer (e.g. prophylactic mastectomy).

**B. Chemotherapy:** overall goal of chemotherapy is to destroy the cancer cells without excessively damaging the normal cells (Appendix 8-1).

**1.** **NURSING PRIORITY** The therapeutic ratio is the guiding principle of chemotherapy. The aim is to administer an antineoplastic agent dose large enough to eradicate cancer cells but small enough to limit adverse effects to safe and tolerable levels.

1. Medications are highly toxic and destroy healthy cells, as well as cancer cells.
2. Combination chemotherapy is more effective than single-dose therapy.
3. Adjuvant therapy: after the initial therapy (surgical or radiation), medications are used to eliminate or slow replication of any remaining cancer cells. For example, tamoxifen may be given in the early stages of breast cancer to block the effects of estrogen, thereby helping to prevent the development of cancer in the other breast.
4. Myelosuppressive effects usually peak in 7 to 10 days after chemotherapy, causing low platelet counts as well as critically low white blood cell counts (leukopenia/neutropenia). The period of time when client is at the lowest level of neutrophil count is called the nadir; this represents the point at which the client is at the highest risk for infection.

**ALERT** Follow procedures for handling biohazardous materials (e.g., chemotherapeutic agents, radiation sources).

5. Vascular access methods of administration (Appendix 6–10).
   a. Peripherally inserted central catheters (PICC): external access central lines.
   b. Tunneled venous access port: catheter is tunneled from exit site to the venous insertion site (Port-A-Cath, Hickman catheter, or Groshong catheter).
   c. Implanted infusion venous access port: a single or double subcutaneous injection port is connected to a central venous catheter. The catheter is placed in a vein, and the other end is connected to a port that is sutured or implanted into the chest wall.

**C. Regional chemotherapy.**
1. Intrathecal or intraventricular: a surgically implanted device positioned under the scalp; used to deliver...
Chemotherapy to the cerebrospinal fluid (e.g., Ommaya reservoir).
2. Intraperitoneal: delivery of chemotherapy into the peritoneal cavity.
3. Intraarterial: catheter placed into an artery and then connected to an infusion pump.

D. Nursing interventions in chemotherapy (Table 8-1).
1. Assess client for symptoms of bone marrow depression (increased bruising and bleeding, sore throat, fever, increased fatigue).
2. Prevent exposure of client to people with communicable diseases or infections.
3. Before therapy, establish a baseline regarding intake and output, bowel habits, oral hygiene, psychologic status, and family relationships.
4. Monitor intake and output; maintain adequate hydration to prevent urinary complications.
5. Inform client that alopecia, if it occurs, is usually transient.
6. Some chemotherapeutic medications are highly irritant (vesicant) and must be administered intravenously into an area of high blood flow (central venous access lines) to provide rapid dilution.

E. Radiation therapy: radiation destroys the cell’s ability to reproduce by damaging the cellular DNA. Cells that are rapidly reproducing are vulnerable to the effects of radiation. Radiation treats select regions of the body to achieve a focused control of the disease.

1. Types of radiation therapy.
   a. External beam therapy (teletherapy): radiation source is outside the body and directed toward the area of the tumor.
      (1) Decreases the incidence of skin surface damage.
      (2) Client should not wash off the markers for the radiation sites.

2. Adverse effects of radiation therapy.
   a. Skin reactions.
      (1) Skin erythema, followed by dry desquamation of the skin in the treatment field.
      (2) Wet desquamation, particularly in areas of skinfolds (breast, perineum, axillary); skin may be blistered.
      (3) Loss of hair on the skin in the treatment field.
      (4) Skin pigmentation and discoloration.
   b. Gastrointestinal disturbances are more pronounced when radiation is delivered to area closely associated with the GI tract.
   c. Cystitis when radiation source is near to urinary tract.
   d. Radiation pneumonitis.
   e. Pericarditis may occur when chest wall receives radiation.

3. Safety precautions to prevent excessive exposure for health care providers (Figure 8-2; also see Box 8-2).
   a. Time: coordinate client care to minimize caregiver’s exposure to the client.
   b. Distance: maintain the maximum distance possible to provide client care. Attempt to maintain distance of 6 feet from the source of radiation.
   c. Shielding: in practice, lead shielding is difficult to work with and is generally not necessary if time and distance principles are observed.

ALERT Follow protocol when handling biohazardous materials (e.g., radiation therapy implants, chemotherapeutic agents). Time, distance, and shielding are critical concepts in caring for a client with a radiation implant.

Box 8-2 NURSING CARE FOR CLIENTS WITH SEALED RADIOACTIVE IMPLANTS

- Plan care so minimal time is spent in the room.
- When close care or prolonged care is required, use a lead shield or wear a lead apron.
- Wear a film badge to measure exposure; do not share film badges.
- Mark on the room and the client care record that pregnant women (including nurses), infants, and children under 16 years should not come in contact with the client during treatment.
- Limit visitors to 30 minutes per day and advise them to stay about 6 feet from the client.
- Save all dressings and bed linens until radioactive source is removed; follow guidelines from radiation safety officer.
- Keep long-handled forceps and lead container in the room in case of dislodgment of a radioactive source.
### NURSING IMPLICATIONS AND CHEMOTHERAPY

<table>
<thead>
<tr>
<th>Problem</th>
<th>Nursing Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone marrow suppression:</td>
<td></td>
</tr>
<tr>
<td>Thrombocytopenia (decreased platelets)</td>
<td>1. Initiate bleeding precautions and observe for bleeding tendency (bruising, hematuria, bleeding gums, etc).</td>
</tr>
<tr>
<td></td>
<td>2. Decrease invasive procedures; minimize injections.</td>
</tr>
<tr>
<td>Anemia (decreased hemoglobin)</td>
<td>1. Fatigue is normal with chemotherapy; client should report any significant increase in fatigue.</td>
</tr>
<tr>
<td></td>
<td>2. Encourage diet high in protein, calories, and iron; administer iron supplements.</td>
</tr>
<tr>
<td>Leukopenia (decreased white cells)</td>
<td>1. Advise health care provider regarding any unexplained temperature elevation above 100°F.</td>
</tr>
<tr>
<td></td>
<td>2. Monitor neutrophil levels.</td>
</tr>
<tr>
<td></td>
<td>3. Protect client from exposure to infections: frequent hand hygiene, location of room, screen visitors, etc.</td>
</tr>
<tr>
<td></td>
<td>4. See Goals for Self-Care.</td>
</tr>
<tr>
<td>Pulmonary toxicity</td>
<td>1. Monitor for persistent nonproductive cough, fever, exertional dyspnea, and tachypnea.</td>
</tr>
<tr>
<td></td>
<td>2. Most cases are cumulative dose related and can be fatal.</td>
</tr>
<tr>
<td>Hyperuricemia (increased serum levels of uric acid)</td>
<td>1. Encourage fluid intake up to 3000 mL daily, if allowed.</td>
</tr>
<tr>
<td></td>
<td>2. Assess for involvement of the kidney, ureters, and bladder.</td>
</tr>
<tr>
<td></td>
<td>3. Allopurinol (Zyloprim) may be used as prevention or as treatment.</td>
</tr>
<tr>
<td>Alopecia</td>
<td>1. Encourage client to wear something to cover the scalp (e.g., wig, scarf, turban, hat).</td>
</tr>
<tr>
<td></td>
<td>2. Avoid exposure of scalp to sunlight.</td>
</tr>
<tr>
<td></td>
<td>3. Do not rub scalp; do not use hair rollers, hair dryers, curlers, or curling irons.</td>
</tr>
<tr>
<td></td>
<td>4. Hair usually grows back in 3-4 weeks after chemotherapy; is usually a different texture and color.</td>
</tr>
<tr>
<td>Stomatitis (mucositis)</td>
<td>1. Encourage good oral hygiene and frequent oral checks.</td>
</tr>
<tr>
<td></td>
<td>a. Encourage frequent mouth rinses of saline solution to keep mucous membranes moist.</td>
</tr>
<tr>
<td></td>
<td>b. Brush teeth with a small, soft toothbrush after every meal and at bedtime.</td>
</tr>
<tr>
<td></td>
<td>c. Remove dentures to prevent further irritation.</td>
</tr>
<tr>
<td></td>
<td>2. Avoid alcohol, spicy or hot foods; mechanical soft, bland diet may be ordered.</td>
</tr>
<tr>
<td></td>
<td>3. Rinse mouth with antacid solutions or viscous lidocaine for pain control.</td>
</tr>
<tr>
<td>GI: anorexia, nausea and vomiting, diarrhea, and constipation</td>
<td>1. Assist client to maintain good nutrition.</td>
</tr>
<tr>
<td></td>
<td>a. Discuss food preferences with client and dietitian; encourage small, frequent meals.</td>
</tr>
<tr>
<td></td>
<td>b. Correlate meals with antiemetic medications.</td>
</tr>
<tr>
<td></td>
<td>c. Encourage family to provide client with favorite foods.</td>
</tr>
<tr>
<td></td>
<td>d. Increase calories, protein, and iron; encourage supplemental vitamins.</td>
</tr>
<tr>
<td></td>
<td>2. Monitor hydration status and electrolyte imbalances.</td>
</tr>
<tr>
<td></td>
<td>3. Evaluate skin around anal area in the client with diarrhea; prevent excoriation.</td>
</tr>
<tr>
<td></td>
<td>4. May be prone to constipation—maintain high fluid and high fiber intake.</td>
</tr>
<tr>
<td></td>
<td>5. Monitor weight.</td>
</tr>
<tr>
<td>Tissue irritation, necrosis, ulceration from infusion therapy</td>
<td>1. Vesicant medications should be administered via a central line to promote dilution of medication. Monitor site for infection.</td>
</tr>
<tr>
<td></td>
<td>2. If multiple drugs are administered, flush between each administration.</td>
</tr>
</tbody>
</table>

**NURSING PRIORITY** Observe client for side effects of a chemotherapeutic agent. If extravasation occurs with a vesicant medication in a peripheral site:

(a) Stop the infusion: remove any remaining drug in the tubing or needle.
(b) Contact physician and consult hospital policy and precautions for specific medication.
(c) Antidote medication may be instilled directly into the infiltrated area.
(d) Ice or heat may be applied to site, depending on the medication; the extremity may be elevated for the first 24 to 48 hours after extravasation.

*GI*, Gastrointestinal; *IV*, intravenous.
   a. Explain that skin reactions after radiation therapy may not develop for 10 to 14 days and may not subside until 2 to 4 weeks after treatment.
   b. Gently cleanse skin with a mild soap; do not remove skin markings.
   c. Avoid tight-fitting clothing; encourage loose-fitting cotton clothes.
   d. Avoid direct sunlight on radiation area.
   e. Avoid exposure of treatment area to all heat and/or cold sources (hot baths, hot water bottles, ice packs).
   f. Do not apply any perfumed or medicated lotions or creams.
   g. Advise client to avoid swimming during treatment period; chemicals can irritate the skin.
   h. Do not use tape, adhesive bandages, cosmetics, lotions, perfumes, powders, or deodorants on the skin in the treatment field.
   i. Closely monitor skin condition on area where x-ray treatment is directed.
5. Nursing implications for a client with an internal radiation source (sealed source) (see Box 8-2).
   a. Observe time, distance, and shield precautions for health care workers as well as all visitors; private room for client.
   b. Use badges or radiation monitors for caregivers having direct client contact.
   c. List on the chart.
      (1) Type of radiation.
      (2) Time inserted.
      (3) Anticipated removal time.
      (4) Specific precautions for the type of radiation used.
   d. Determine specific nursing care related to implant.
      (1) Uterine implant: prevent dislodgement—maintain bed rest; do not elevate head of bed past 20 degrees; low-residue diet; urinary retention catheter; prevent complications of immobility.
      (2) Head and neck implant: closely observe for minor oozing or bleeding from area; radiation may invade the carotid artery. If massive bleeding occurs, apply direct digital pressure to the site and call for assistance.
6. Nursing implications for the client receiving systemic (intravenous) radiation therapy.
   a. Systemically administered radionuclides—radioisotopes (e.g., \( ^{131}I \) for thyroid cancer)—will initially cause radioactive body secretions.
   b. Keep linens, dressings, and trash in client’s room until radiation safety office determines how and when they can be removed.
   c. Be aware of the type of radiation administered and the half-life of the isotope; this will determine how long the body secretions are radioactive.
F. Hematopoietic stem cell transplantation: transplanted cells engraft or bond tightly to existing bone marrow cells.

1. Impaired growth and development, especially from radiation to growth centers of the bone during early childhood and adolescence.
2. Damage to the central nervous system.
3. Gonadal aberrations, including reproductive, hormonal, genetic, and teratogenic effects.
4. Disturbances to other organs, including pneumonitis, pericarditis, pleurisy, hypothyroidism, and cystitis.

Oncologic Emergencies

A. Life-threatening problems arising from tumor progression, response to chemotherapy or radiation therapy, extensive surgical resection.
B. Obstructive emergencies: caused by tumor growth and obstruction of an organ or blood vessel.
   1. Superior vena caval syndrome: may be associated with Hodgkin's disease or lung cancer.
      a. Symptoms: periorbital and facial edema; distention of the veins in the head, neck and chest; headache and possible seizures.
      b. Treatment: radiation or chemotherapy.
   2. Tracheobronchial compromise: may occur in the upper or lower airway; most commonly occurs secondary to a lung tumor.
      a. Symptoms: stridor and hypoxia.
      b. Treatment: bronchodilators, steroids, and possible intubation.
   3. Spinal cord compression: caused by a tumor growth into the epidural space of the spinal cord.
      a. Symptoms: intense, severe back pain; motor weakness and dysfunction; sensory paresthesia; changes in bowel and bladder.
      b. Treatment: radiation and corticosteroids.
   4. Intestinal obstruction from tumor growth: see Chapter 18.
C. Third-space syndrome: fluid shifts from the vascular space to the interstitial space; may be associated with extensive surgical resection.
   1. Symptoms: hypovolemia with hypotension, tachycardia, low CVP, decreased urine output.
   2. Treatment: fluid replacement; however, hypervolemia can occur very easily.
D. Metabolic emergencies.
   1. Syndrome of inappropriate antidiuretic hormone (SIADH): results from production of ADH by the cancer cells or by stimulation of ADH production by the chemotherapy.
      a. Symptoms: sustained production of antidiuretic hormone (ADH) leading to water retention, hyponatremia (dilutional), weight gain, weakness, GI disturbances.
      b. Treatment: correct sodium balance-water balance; treat underlying malignancy.
   2. Hypercalcemia: results from metastatic disease of the bone or secretion of parathyroid-like hormone by the cancer cells (see Chapter 6).
      a. Symptoms: apathy, fatigue, muscle weakness, polyuria, GI disturbances, electrocardiogram changes. Immobility and dehydration also contribute to development of hypercalcemia.
      b. Treatment: long-term treatment aimed at primary malignancy; hydration, diuretics, and bisphosphonates
   3. Tumor lysis syndrome: often triggered by chemotherapy when a large number of cancer cells die and a host of intracellular components are released into the blood.
      a. Symptoms: four hallmark signs—hyperuricemia, hyperphosphatemia, hyperkalemia, and hypocalcemia—may occur within the first 24-48 hours after initiation of treatment.
      b. Treatment: increase fluids to support renal function, correct electrolyte imbalances, adequate hydration to decrease uric acid concentrations.
E. Infiltrative emergencies.
   1. Cardiac tamponade (Chapter 17).
   2. Carotid artery rupture (Chapter 17).

Nursing Interventions

Goal: To maintain client at optimum psychosocial level.
A. Encourage verbalization.
B. Assist client to understand disease process and therapeutic regimen.
C. Include family in the care.
D. Assist client to cope with changes in body image caused by alopecia (see Table 8-1).
E. Assess client's coping skills and support systems. Encourage communication and be an active listener.
F. Recognize client's emotional outbursts and anger as part of the coping process.
G. Encourage measures to maintain client's ego.
   1. Allow client to participate in his or her own care and make decisions.
   2. Maintain active listening.
   3. Encourage personal lifestyle choices (clothing, makeup, hobbies, etc).
   4. Discuss body image issues.

Goal: To maintain nutrition (see Table 8-1).
A. Diet: appropriate to age level.
B. Hyperalimentation (see Chapter 18) to maintain adequate intake.
C. Prevent and/or decrease complications associated with nutrition.

Goal: To maintain normal elimination pattern (see Table 8-1).
A. Prevent and/or decrease complications of diarrhea.
B. Prevent constipation.
C. Prevent urinary tract infections, primarily cystitis.
CHAPTER 8 Abnormal Cell Growth

1. Maintain adequate fluid intake (at least 3000 mL per day).
2. Frequently assess for symptoms of cystitis (see Chapter 23).
3. Avoid bladder catheterization if possible. 
4. Check urine for presence of hematuria.
5. Encourage frequent voiding.
6. Assess for the development of vesicovaginal or rectovaginal fistulas.

**Goal:** To prevent and/or decrease infectious process (see Table 8-1).
A. Monitor white cell counts, be aware of onset and point of nadir. 
B. Meticulous personal hygiene including frequent handwashing.
C. Child should be isolated from others with communicable diseases.
D. Frequently assess for potential infectious processes.
E. Fresh fruits and vegetables should be eaten only after they have been cooked, peeled, or washed thoroughly.
F. See goals for self-care. 

**Goal:** To decrease hematologic complications.
A. Evaluate for decreasing platelet levels and thrombocytopenia.

**NURSING PRIORITY** Institute bleeding precautions if platelet count is less than 50,000/mm³.

B. Administer platelets and whole blood transfusions as indicated.
C. Evaluate areas of potential bleeding.
1. Mucous membranes, nosebleed (epistaxis).
2. Urinary tract (hematuria), stool (melena).
3. GI bleeding (hematemesis).
4. Implement bleeding precautions (see Box 14-1).

**NURSING PRIORITY** Advise client to use electric razor and a soft-bristle toothbrush.

D. Anemia (see Table 8-1).
1. Maintain adequate rest; encourage client to pace activities to avoid fatigue.
2. Maintain adequate oxygenation.
3. Assess for problems with erythropoiesis.
4. Evaluate respiratory and cardiac systems for mechanisms of compensation.

**Goal:** To relieve pain (see Chapter 3).
A. Evaluate client and family responses to pain.
B. Evaluate characteristics of pain: determine whether pain control is to be palliative.
C. Administer medications for pain relief.
D. Utilize nonpharmacologic approaches to pain relief (positioning, imagery, hypnosis, etc.).

**Goal:** To recognize complications specific to radiation and chemotherapy.
A. Alopecia.
B. Hemorrhagic problems.
C. Gastrointestinal distress (anorexia, ulcerations, nausea, vomiting).
D. Bone marrow depression (myelosuppression).
1. Thrombocytopenia.
2. Anemia.
3. Neutropenia.
E. Skin reactions.
F. Decreased immune response.

**NURSING PRIORITY** It is important for the nurse to be able to differentiate between toxic effects of medication or radiation therapy and the progression of the disease process.

**Home Care**

**Goal:** To effectively manage pain to provide client optimal rest and pain relief.
A. Assess quality, intensity, timing, and location of pain to establish baseline.
B. Identify provoking and alleviating factors and adjust environment accordingly.
C. Assess other psychologic factors affecting pain tolerance (fear, anxiety, agitation, and past experiences with pain).
D. Discuss questions regarding addiction to narcotic analgesics.
E. Assist client with nonpharmacologic pain therapies (Chapter 3).
F. Layer pain management strategies as needed; medicate with narcotic and non-narcotic analgesics as necessary.
G. Advocate for patient-controlled analgesia when appropriate.
H. Assess effectiveness of therapies and medications and modify as necessary.
I. Provide a calm, healthy environment with appropriate lighting and personal belongings as warranted by disease progression.
J. When appropriate, suggest hospice care, which can provide compassion, concern, and support for the terminally ill client.

**Goal:** To decrease or limit exposure to infection.
A. Limit number of people having direct contact with the client.
B. Good oral hygiene: regular flossing if there is no bleeding problem and no tissue irritation; soft toothbrush; avoid irritating foods.
C. Client should avoid coming in direct contact with animal excreta (cat litter boxes, bird cages, etc).
D. Teach client to take his or her temperature daily and report temperature over 100° F (38° C).
E. Use antipyretics cautiously because they tend to mask infection.
F. Teach client that peak of neutropenia (nadir), or highest risk for infection, occurs within 7 to 14 days after the administration of chemotherapy.
G. Teach client about radiation-induced skin reactions and provide nursing care for these skin reactions.
1. Moisturize skin 3 to 4 times a day with nonperfumed, nonmedicated cream or lotion.
2. If moist desquamation occurs, cleanse gently with normal saline solution; area should be gently patted dry or air-dried; expose areas to air for 10 to 15 minutes three times a day.
3. Avoid use of perfumes, deodorants, powders, and cosmetics to affected area.
4. Wear loose-fitting cotton clothing; avoid swimming.
5. If dry desquamation is present, apply lotion that is not perfumed, not medicated, and does not contain alcohol.

H. Teach client importance of frequent handwashing.

Appendix 8-1 CANCER CHEMOTHERAPY

**General Nursing Implications**

— Observe for adverse effects (see Table 8-1).
— Dosage is usually based on client’s body weight.
— Monitor client and laboratory values for evidence of bone marrow suppression: infection from loss of neutrophils, bleeding from loss of thrombocytes, and anemia from loss of erythrocytes.
— Avoid contact with skin when preparing chemotherapy medications that are vesicants.
— Do not administer a vesicant through a hand or wrist intravenous site; most are administered via a CVAD.
— General side effects of antineoplastic agents: nausea, vomiting, diarrhea, anorexia, alopecia, hyperuricemia, nephrotoxicity.
— Monitor renal and hepatic function to evaluate ability of client to break down and excrete chemotherapeutic agents.

**MEDICATION**

<table>
<thead>
<tr>
<th>ALKYLATING AGENTS</th>
<th>SIDE EFFECTS</th>
<th>NURSING IMPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclophosphamide (Cytoxan, Neosar)</td>
<td>Renal, hepatotoxic</td>
<td>1. Monitor for hemorrhagic cystitis; encourage high fluid intake</td>
</tr>
<tr>
<td>Mechlorethamine (nitrogen mustard) (Mustargen)</td>
<td>Blood dyscrasias</td>
<td>1. Strong vesicant; prevent extravasation and direct contact with the skin</td>
</tr>
<tr>
<td>Chlorambucil (Leukeran)</td>
<td>Pulmonary infiltrates and pulmonary fibrosis, hepatotoxic</td>
<td>1. Monitor respiratory status and maintain good respiratory hygiene</td>
</tr>
<tr>
<td>Busulfan (Myleran)</td>
<td>Pulmonary infiltrates and pulmonary fibrosis, sterility</td>
<td>1. Monitor respiratory status and maintain good respiratory hygiene</td>
</tr>
<tr>
<td>Ifosfamide (Mitoxana)</td>
<td>Hemorrhagic cystitis</td>
<td>1. High risk for cystitis; urinalysis done before each dose</td>
</tr>
<tr>
<td>Carmustine (BCNU)</td>
<td>Crosses the blood-brain barrier, May have delayed bone marrow suppression</td>
<td>1. Nadir occurs at 4-6 weeks after beginning treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. May have severe nausea and vomiting</td>
</tr>
</tbody>
</table>

**Platinum Compounds**

<table>
<thead>
<tr>
<th>PLATINUM COMPOUNDS</th>
<th>SIDE EFFECTS</th>
<th>NURSING IMPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisplatin (Platinol)</td>
<td>Renal damage is dose-limiting factor Neurotoxicity, ototoxicity Dose limited by bone marrow suppression</td>
<td>1. Produces nausea and vomiting within an hour of administration</td>
</tr>
<tr>
<td>Carboplatin (Paraplatin)</td>
<td></td>
<td>2. Assess for tinnitus and hearing loss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Encourage high fluid intake; may be coupled with diuretics</td>
</tr>
</tbody>
</table>

Continued
### Appendix 8-1  CANCER CHEMOTHERAPY—cont’d

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>SIDE EFFECTS</th>
<th>NURSING IMPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antimetabolites</strong> Disrupt critical cellular metabolism; cell-cycle specific. Dose limited by bone marrow suppression.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Folic Acid Analogs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methotrexate sodium (Folex, Mexate)</td>
<td>Pulmonary infiltrates and fibrosis; oral and GI ulceration High doses can damage kidney Teratogenic</td>
<td>1. Leucovorin may be administered to increase uptake; can be potentially dangerous 2. Monitor GI status; potential of intestinal perforation; nausea and vomiting occur early 3. Encourage high fluid intake to promote drug excretion 4. Avoid pregnancy for at least 6 months 5. Do not take folic acid.</td>
</tr>
<tr>
<td>Premetrexed (Alimta)</td>
<td>Teratogenic GI toxicity—stomatitis and diarrhea may be dose limiting</td>
<td>1. Vitamin B₁₂ and folic acid to decrease bone marrow and GI toxicity 2. Avoid in pregnancy</td>
</tr>
<tr>
<td><strong>Pyrimidine Analogs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cytarabine (ARA-C)</td>
<td>High doses may cause pulmonary edema and neurotoxicity</td>
<td>1. Nausea and vomiting after bolus administration 2. Monitor pulmonary status and fluid balance</td>
</tr>
<tr>
<td>Fluorouracil (Adrucil)</td>
<td>Stomatitis, GI ulceration</td>
<td>1. Monitor and report early GI symptoms; may be discontinued</td>
</tr>
<tr>
<td><strong>Purine Analogs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mercaptopurine (Purinethol)</td>
<td>Hepatic dysfunction, GI ulceration Mutagenic</td>
<td>1. Monitor for jaundice 2. Allopurinol increases risk for toxicity</td>
</tr>
<tr>
<td>Thioguanine (Tabloid)</td>
<td>Hepatic dysfunction; GI ulceration</td>
<td>1. Monitor for jaundice</td>
</tr>
<tr>
<td><strong>Antitumor Antibiotics</strong> Interfere with DNA synthesis; are not used to treat infections. Poor GI absorption, given IV.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Anthracyclines</strong></td>
<td>Cause bone marrow suppression and cardiac damage</td>
<td>1. Dysrhythmias may occur minutes after administration 2. Monitor cardiac status and rhythm 3. Encourage follow-up after therapy to evaluate cardiac status</td>
</tr>
<tr>
<td>Doxorubicin (Adriamycin)</td>
<td>Acute dysrhythmias, delayed cardiotoxicity; heart failure</td>
<td></td>
</tr>
<tr>
<td>Daunorubicin (DaunoXome)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nonanthracyclines</strong></td>
<td>Bone marrow suppression and GI mucositis are dose limiting</td>
<td>1. Strong vesicant 2. Monitor mouth for ulcerations</td>
</tr>
<tr>
<td>Dactinomycin (Actinomycin-D, Cosmegen)</td>
<td>Bone marrow suppression is dose limiting</td>
<td>1. Monitor pulmonary functions and report any adverse changes</td>
</tr>
<tr>
<td>Bleomycin (Blenoxane)</td>
<td>Pulmonary injury is dose limiting</td>
<td></td>
</tr>
<tr>
<td>Mitomycin (Mutamycin)</td>
<td></td>
<td>1. Nadir occurs in about 3–4 weeks 2. Monitor for anemia and renal damage</td>
</tr>
<tr>
<td>MEDICATION</td>
<td>SIDE EFFECTS</td>
<td>NURSING IMPLICATIONS</td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>----------------------</td>
</tr>
<tr>
<td><strong>Mitotic Inhibitors</strong> Prevent cell division.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vinca Alkaloids</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vinblastine (Velban)</strong></td>
<td>Dose limiting by bone marrow suppression</td>
<td>1. Severe vesicant</td>
</tr>
<tr>
<td><strong>Taxanes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paclitaxel <em>(Taxol, Onxol)</em></td>
<td>Severe hypersensitivity reactions Dose limiting by bone marrow suppression, peripheral neuropathy, and cardiac problems Severe neutropenia</td>
<td>1. Administered by 24-hour infusion 2. Assess for bradycardia and heart blocks 3. Assess reflexes, weakness, paresthesias, sensory loss</td>
</tr>
<tr>
<td><strong>Docetaxel (Taxotere)</strong></td>
<td>Hepatotoxic</td>
<td>1. Monitor LFS</td>
</tr>
<tr>
<td><strong>Hormonal Agents</strong> Mimic or block the action of hormones.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Androgen Antagonist</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leuprolide <em>(Eligard, Lupron)</em></td>
<td>Used to treat prostate cancer Impotence Increased risk for fractures</td>
<td>1. Encourage activity to minimize bone loss; increase intake of calcium and vitamin D; increase weight-bearing activities</td>
</tr>
<tr>
<td><strong>Flutamide (Eulexin)</strong></td>
<td>Gynecomastia</td>
<td></td>
</tr>
<tr>
<td><strong>Antiestrogens</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tamoxifen <em>(Nolvadex)</em></td>
<td>Used to treat breast cancer Increases incidence of endometrial cancer and thromboembolic problems</td>
<td>1. Dosage for prevention of breast cancer continues for 5 years 2. Teach activities to prevent venous stasis</td>
</tr>
<tr>
<td>Raloxifene <em>(Evista)</em></td>
<td>Do not increase incidence of endometrial cancer Increases risk for osteoporosis</td>
<td>1. Used to treat breast cancer in postmenopausal women 2. Encourage activity to minimize bone loss: increase intake of calcium and vitamin D; increase weight-bearing activities</td>
</tr>
<tr>
<td>Fulvestrant <em>(Faslodex)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anastrozole <em>(Arimidex)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Immunostimulants</strong> Biologic response modifiers alter the host response to cancer cells.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interferon 2a <em>(Roferon-A)</em></td>
<td>Flu-like symptoms (fever, chills, fatigue, myalgia) Profound fatigue may be dose limiting</td>
<td>1. Symptoms tend to diminish with continued therapy</td>
</tr>
<tr>
<td>Aldesleukin <em>(Interleukin 2)</em></td>
<td>Flu-like symptoms (fever, chills, fatigue), nausea, vomiting, diarrhea Hypotension, anemia Hepatotoxicity, nephrotoxicity Capillary leak syndrome (CLS): hypotension, reduced organ perfusion, pulmonary edema</td>
<td>1. Toxicity is common in most clients, may be administered in an intensive care setting, toxicity occurs soon after administration 2. CLS: observe for adequate renal perfusion, hypotension 3. Monitor urine output and liver and renal function studies</td>
</tr>
</tbody>
</table>

*BP*, Blood pressure; *ECG*, electrocardiogram; *GI*, gastrointestinal; *IV*, intravenous; *CV AD*, central venous access device.
1. The nurse receives report on assigned clients. One client is reported to be at the nadir for his cancer chemotherapy. How will this affect the nursing care plan? 
   1. Implement bleeding precautions.
   2. Reinforce measures and teaching regarding preventing infections.
   3. Anticipate nutritional problems caused by nausea and vomiting.
2. The nurse is assessing a client after beginning external radiation. What is a nursing observation that confirms the presence of early side effects of the radiation? 
   1. A gradual weight loss and GI disturbances
   2. Skin erythema followed by dry desquamation
   3. Vertigo when sitting up quickly
   4. Excioriation and blisters on the affected skin
3. What are the nursing interventions regarding the care of a client with a vaginal radium implant? 
   1. Clamp and drain the urinary retention catheter.
   2. Provide a high-residue diet.
   3. Place the client in a semiprivate room.
   4. Raise the head of the bed no more than 20 degrees.
4. What is an important aspect of client teaching regarding external radiation therapy? 
   1. Remain isolated after treatments.
   3. Schedule treatments monthly.
   4. Leave skin markings between treatments.
5. A client is receiving chemotherapy with several antineoplastic agents. Which nursing observation is considered a common side effect of chemotherapy? 
   1. Slow, slurred speech
   2. Increased leukocytes on complete blood count
   3. Gingivitis and oral ulcers
   4. Sinus dysrhythmias with bradycardia
6. A client is going to begin external radiation therapy for his lung cancer. Which comment by the client would indicate the need for additional teaching? 
   1. “I will shower with a mild soap and check my skin for areas of redness.”
   2. “I am looking forward to swimming laps again for my exercise.”
   3. “I am going to eat small meals and increase the protein and fiber in my diet.”
   4. “I will use only unscented emollient creams to the dry skin areas on my chest.”
7. The nurse is evaluating a central venous line before administering the client’s chemotherapy. What observation would cause the nurse the most concern? 
   1. Nurse is unable to withdraw blood into line.
   2. Dressing was changed 24 hours ago.
   3. Inflammation and exudate are present at the insertion site.
   4. Fluid infusing is D5W and 0.45% normal saline.
8. The nurse understands that the following are general adverse effects of antineoplastic drugs. Select all that apply.
   1. Urinary retention
   2. Infertility
   3. Stomatitis
   4. Bone marrow depression
   5. Extravasation
   6. Nausea
9. The nurse is updating a teaching plan for a client who has cancer and has been taking doxorubicin (Adriamycin) for the past several months. What is important to review with the client? 
   1. Report symptoms of hematuria.
   2. Increase intake of oral fluids.
   3. Avoid folic acid intake.
10. A client is receiving busulfan (Myleran). The nurse would notify the physician regarding which assessment finding? 
    1. Persistent nonproductive, dry cough
    2. Hemoglobin 13 g/dL, hematocrit 38%
    3. Nausea and vomiting
    4. Low serum uric acid
11. A client asks the nurse why he has to take several chemotherapy agents at the same time. The nurse’s response would be based on which principle? 
    1. The more medications that can be given together, the shorter the treatment period.
    2. The cost is decreased because the medications are administered at the same time.
    3. Multiple medications given together will attack the cancer cells at different levels.
    4. One medication will interact with another to reduce incidence of side effects.
12. A client has developed stomatitis while receiving chemotherapy. What would be an appropriate intervention to suggest for the pain associated with the stomatitis? 
    1. Use lemon-flavored glycerin swabs.
    2. Apply antacid coating solutions and viscous lidocaine.
    3. Brush oral plaques off with a soft toothbrush.
    4. Have client swish mouth with a weak hydrogen peroxide solution.
13. What is a common side effect of radiation therapy that is not associated with the effect of radiation in the treatment field? 
    1. Reddened skin
    2. Bone marrow suppression
    3. Fatigue
    4. GI disturbances

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