- Use a sterile gauze pad when priming intravenous (IV) tubing, connecting and disconnecting tubing, inserting syringes into vials, breaking glass ampules, or performing any other procedure in which antineoplastic drugs may be inadvertently discharged.

- Dispose of all contaminated needles, syringes, IV tubing, and other contaminated equipment in a leak-proof and puncture-resistant container; do not recap or break needles.

Radiotherapy

Radiotherapy is frequently used in the treatment of childhood cancer, usually in conjunction with chemotherapy or surgery. It can be used for curative purposes or for palliation to relieve symptoms by shrinking the size of the tumor. Recent advances in radiotherapy have optimized its beneficial effects and minimized many of the undesirable side effects, although high-dose irradiation is associated with many serious late effects.

Ionizing radiation is cytotoxic in at least three different ways: (1) damaging the pyrimidine bases cytosine, thymine, and uracil needed for the synthesis of nucleic acids; (2) causing single-strand breaks in the DNA or RNA molecule; or (3) causing double helical–strand breaks in these molecules. The effect of disturbing cellular metabolic and reproductive functions is either sublethal or lethal damage. *Lethal damage* refers to the death of the cell. *Sublethal damage* refers to injured cells that may subsequently be repaired. Many of the acute side effects are the result of lethal damage to radiosensitive tissue, particularly proliferating cells such as those of the bone marrow, gastrointestinal tract, and hair follicles. Late effects are usually the result of cell death.

The acute untoward reactions from radiotherapy depend primarily on the area to be irradiated. Total-body irradiation is associated with the most severe reactions and is employed to prepare the immune system for blood or marrow transplantation (BMT). Table 25-1 summarizes the acute effects of radiotherapy and nursing interventions that may be helpful in mitigating or preventing them. In limited areas of the country, proton beam radiation is available. Protons are positively charged subatomic particles that deposit energy differently than x-ray beams. There is no "exit dose" beyond the tumor involved in proton radiotherapy;