Radiation Therapy 101: The Basics
Every Nurse Needs to Know

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1. Radiation dosage is measured in terms of:
   a. Ohms.
   b. Volts.
   c. Amps.
   d. Centigray.

2. The main difference between the side effects of radiation therapy and chemotherapy is that:
   a. Chemotherapy side effects are more toxic and take longer to recover from than radiation side effects.
   b. Chemotherapy side effects are systemic, but radiation side effects are more localized.
   c. Patients receiving radiation therapy more frequently require breaks from treatment for side-effect management than do patients receiving chemotherapy.
   d. With appropriate medication and rapid nursing intervention, the side effects of radiation therapy can be eliminated, whereas chemotherapy side effects cannot.

3. Mr. Smith will receive an extended course of radiation therapy for a nasopharyngeal tumor that will last seven weeks with a total accumulated dose of 7,000 cGy. In preparing the teaching plan for Mr. Smith, the nurse would want to include what information?
   a. Xerostomia will be transient, and Mr. Smith can expect normal salivary function to return when his radiation treatments are complete.
   b. Xerostomia will be permanent and require a lifestyle adjustment and possible medical intervention.
   c. Mr. Smith will not need to worry about xerostomia because he is not scheduled for an interstitial implant.
   d. With aggressive oral hygiene, prompt nursing intervention, and dietary modifications, xerostomia will not be problematic.

4. Brachytherapy can best be defined as:
   a. Use of sealed sources of radioactive material placed in or near the tumor site.
   b. Administration of IV medication that serves as a radioprotectant.
   c. Administration of external beam radiation therapy via linear accelerator twice per day to achieve control of a rapidly growing tumor.
   d. Increasing tissue temperature levels to allow tumor cells to be more radiosensitive and yield a higher cell kill rate.

5. Which of the following conditions is most radiosensitive?
   a. Metastatic melanoma
   b. Intracranial glioblastoma multiforme
   c. Low-grade stage I or II non-Hodgkin’s lymphoma
   d. Renal cell tumor

6. Which of the following oncologic emergencies does not respond to radiation therapy?
   a. Superior vena cava syndrome
   b. Spinal cord compression
   c. Increased intracranial pressure secondary to tumor effect
   d. Tumor lysis syndrome

7. Mr. Jones, a 62-year-old man, is newly diagnosed with prostate cancer. He is being discharged following an acute attack of nephrolithiasis. Previously, he had decided to get an iodine-125 prostate seed implant, which he is scheduled to receive in one month. Prior to his discharge, he confides that he is worried about the recovery time involved with the upcoming implant surgery. He says that he needs to return to work as soon as possible to support his wife and daughter, who is pregnant and recently moved her family in with them because of financial difficulties. What would be the oncology nurse’s best response?
   a. “Because of your recent nephrolithiasis, you probably will not be having that implant. Therefore, your concerns about missing work are unnecessary.”
   b. “It sounds like you have a lot on your mind. I’ll contact social services and see if they can intervene on your behalf.”
   c. “Your recovery may take months, but your job will be safe as a result of legislation enacted under the Americans with Disabilities Act.”
   d. “How much contact will you have with your daughter while she is living with you and your wife?”

8. Mrs. Butler just finished six weeks of external beam radiation treatments for breast cancer on the left side. Mr. and Mrs. Butler are celebrating by going...
away on a two-week Mediterranean cruise. The nurse should emphasize which of the following statements as part of her discharge instructions?

- a. Plan to rest and not overexert yourself because a significant portion of your heart was in the radiation field.
- b. Minimize sun exposure to your chest and be sure to use a sun block with at least a 15 sun protection factor (SPF).
- c. Be sure to take a scarf or wig with you because your hair likely will begin to fall out while you are away.
- d. You should reserve an end cabin on the ship with separate beds to minimize radiation exposure to your husband and others on board.

9. Mr. Gaylord, 59 years old, has a known history of renal cell cancer. He was admitted to the hospital because of increased confusion and progressive left leg numbness that radiates to his toes. His past medical history includes hypertension, myocardial infarction 10 years ago, insulin-dependent diabetes mellitus, and asthma. He is found to have a 3 cm solitary brain lesion with a moderate amount of surrounding edema. Based on the previous information, which of the following admission orders should the nurse question?

- a. Stat cardiac enzymes and stress test
- b. Consult to neurosurgery
- c. Consult to radiation oncology
- d. Administer 10 mg dexamethasone via IV now, followed by 4 mg via IV or orally every six hours.

10. Mr. Gaylord has received 6 of his planned 10 radiation treatments and will receive the remaining 4 treatments as an outpatient. The plan is to discharge him today. However, he is reporting visual disturbances, increased fatigue, muscle weakness, and increased thirst. Based on all of the information known about Mr. Gaylord (see question 9), the nurse should immediately anticipate which of the following?

- a. Arrangements for discharge because these are expected side effects for someone with his disease and treatment plan
- b. A brain imaging study because his tumor likely has grown rapidly since initiating radiation
- c. A consult for hospice care
- d. Stat blood work that includes a comprehensive metabolic panel

**Answers**

**Question 1:** The correct answer is choice d. Gray (Gy) or centigray (cGy) are the most commonly accepted terms that describe radiation dosage as a unit of measurement (Bruner, Bucholtz, Iwamoto, & Strohl, 1998). An ohm measures the amount of electrical resistance. An amp measures the amount of electrical current flow, and a volt measures electrical pressure.

**Question 2:** The correct answer is b. The side effects of radiation therapy are site-specific (Maher, 2000). Choices a and c are incorrect because toxicities and side effects of chemotherapy and radiation therapy vary and are dependent on drug and organ dose tolerance. Choice d is incorrect because although newer medications and early nursing diagnosis and intervention can help minimize complications from radiation side effects, they cannot be completely eliminated.

**Question 3:** The correct answer is choice b. Xerostomia occurs with radiation doses between 1,000 cGy and 2,000 cGy. Permanent xerostomia occurs when the total dose exceeds 4,000 cGy (Bruner et al., 1998). Choice a is incorrect because, at the described dose of radiation, the patient’s xerostomia will be permanent. Transient xerostomia occurs at doses between 1,000 cGy and 2,000 cGy. Some radiation oncologists may choose to administer amifostine to help minimize the permanent effects of xerostomia. The efficacy of this drug has been variable, and long-term data is not available. In the described clinical scenario, amifostine is not mentioned as part of Mr. Smith’s care. Choice c is incorrect because, although an interstitial implant would raise the total dose of radiation the patient receives, he already is prescribed to receive a dosage that will cause permanent xerostomia. Choice d is incorrect because aggressive oral hygiene, prompt nursing intervention, and dietary restrictions may help minimize complications from xerostomia but cannot prevent it from occurring.

**Question 4:** Choice a, use of sealed sources of radioactive material placed in or near the tumor site, is the correct answer and the most commonly accepted definition of brachytherapy (Bruner et al., 1998; Hollan, 2001). Choice b is incorrect because brachytherapy refers to the use of sealed radioactive sources and does not involve IV administration of a radioprotectant. Choice c, administration of external beam radiation therapy via linear accelerator twice per day, is incorrect because the term “hyperfractionation” describes the process of administering radiation therapy more frequently than once a day. Choice d, increasing tissue temperature levels to allow tumor cells to be more radiosensitive, is known as hyperthermia.

**Question 5:** The correct answer is choice c. Low-grade lymphomas are responsive to radiation therapy. Doses of 25–35 Gy delivered in 10–20 fractions over two to four weeks result in local disease control in more than 95% of patients (Gospodarowicz & Wasserman, 1998). Choices a (metastatic melanoma), b (glioblastoma multiforme), and d (renal cell tumor) are highly radioresistant tumors and frequently require doses that exceed the tolerance of surrounding or involved tissue.

**Question 6:** The correct answer is choice d, tumor lysis syndrome. Choices a (superior vena cava syndrome), b (spinal cord compression), and c (increased intracranial pressure secondary to tumor effect) are oncologic emergencies that commonly are treated with radiation therapy, which provides excellent short-term results for these conditions. Tumor lysis syndrome is treated with IV hydration, urinary alkalinization, reduction of uric acid production, and diuretics (Ezzone, 1999; Lydon, 2000). In some cases, radiation therapy actually may contribute to tumor lysis syndrome (Cope, 1999; Ezzone).

**Question 7:** The correct answer is d. Women, pregnant and possibly pregnant women, and children younger than three years are at risk and should avoid close (i.e., less than 6 feet) and lengthy (more than five minutes per day) contact with the patient for the first two months after prostate iodine-125 radioactive seed implantation (Abel et al., 1999). Although this is the current practice in most clinical settings, some evidence suggests that limiting exposure time to others is unnecessary. Smathers et al. (1999) found that, based on Nuclear Regulatory Commission safety guidelines for radiation exposure to humans, exposure to loved ones of patients with an iodine-125 seed implant would have to exceed 20 hours (58 hours for a palladium-103 implant) of direct skin-to-skin contact with the area directly above the penis to be vulnerable to the harmful effects of radiation. Human exposure to lateral skin surfaces would have to exceed 500 hours. Daily practice lagging behind research findings is not uncommon. This practice discrepancy exists from institution to institution as well as from region to region. However, option d is the most commonly accepted practice that currently is used to minimize patient anxiety and fear regarding radiation seed implantation and possible exposure of family members. Answer a is incorrect. Nephrolithiasis does not preclude someone from receiving prostate brachytherapy. Answer b also is incorrect. A social service consult may benefit Mr. Jones; however, this kind of response from the nurse,
as well as the response in option c, does not promote therapeutic communication with the patient. The Americans with Disabilities Act likely will not cover Mr. Jones because he probably will not experience a long-term disability from the brachytherapy procedure.

Question 8: The correct answer is choice b. One of the early side effects of radiation therapy includes increased skin sensitivity and vulnerability from sun exposure (Hassey & Rose, 1982). In direct sunlight, irradiated skin should be protected with an SPF of at least 15 (Sitton, 1992). Choice a is incorrect because, when the left breast is treated properly, only a very small portion of the heart is in the radiation treatment field. However, this usually does not cause any cardiac-related morbidity and is not a primary concern at this point in the patient’s postradiation care. Answer c is incorrect. Because the patient did not receive radiation to the head, alopecia should not occur. Choice d is incorrect. The patient is not considered radioactive during or after her prescribed treatments; therefore, minimizing exposure to the patient’s spouse and the public is unnecessary.

Question 9: The correct answer is choice a, the nurse should question an order for stat cardiac enzymes because a stress test, surgery, radiation, and administration of glucocorticoids (choices b, c, d) all are standards of care for patients who have a solitary brain mass with surrounding edema and a known history of cancer (Bucholtz, 1997). Although he has a cardiac history, Mr. Gaylord’s symptoms currently do not suggest a cardiac-related event, and with a known lesion in the brain and subsequent edema, the described interventions in choices b, c, and d are most appropriate at this time.

Question 10: The correct answer is choice d, stat blood work that includes a comprehensive metabolic profile. The patient’s symptoms are classic signs of hyperglycemia (Solares, Agana-Defensor, Song-Mayeda, & Dulmey Canada, 2002). Because of his diabetic history and the use of glucocorticoids to treat the edema in his brain from a metastatic brain tumor, Mr. Gaylord is exhibiting signs of hyperglycemia that could lead to a state of diabetic ketoacidosis. A glucose level needs to be obtained by using a blood glucose meter or by obtaining a stat comprehensive metabolic profile because hyperglycemia is a possible side effect of dexamethasone (Bucholtz, 1997). Choice a is incorrect because the described side effects (i.e., visual disturbances, muscle weakness, and increased thirst) are not expected side effects during the course of radiation therapy. Choice b also is incorrect. Although the tumor may continue to enlarge during treatment, a metastatic brain tumor likely would not rapidly progress during treatment and glucocorticoid therapy. The patient’s described symptoms are more consistent with hyperglycemia. Choice c is incorrect because a hospice consult would not address the patient’s immediate need for intervention to relieve present symptoms.

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References