Development of a Radiation Skin Care Protocol and Algorithm Using the Iowa Model of Evidence-Based Practice

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Limited evidence-based standards of care exist in the management of irradiated skin; therefore, the development of a skin care protocol is necessary to improve patient outcomes. This article describes the use of the Iowa Model of Evidence-Based Practice to Promote Quality Care as a framework to identify and validate current evidence. The resulting radiation therapy algorithm provided a succinct guideline for nurses to direct the prevention and management of skin damage secondary to radiation therapy, thus improving quality care.

About 60% of cancer cases require radiation therapy, which is a common treatment modality and a palliative intervention for cancer-related symptoms (National Cancer Institute [NCI], 2010). However, side effects are common with radiation therapy; an estimated 85%–95% of patients with cancer that receive radiation therapy will develop some degree of skin damage (McQuestion, 2006). Despite the frequent occurrence of those side effects, limited evidence-based standards of care exist on its prevention and management. Skin care recommendations vary amongst institutions and individual practitioners, and often are based on expert opinion rather than research evidence for use in the prevention and treatment of radiation-induced skin changes (D'Haese et al., 2005). The development of an evidence-based protocol and algorithm to manage skin changes secondary to radiation therapy is needed to support a practice change and guide the improvement of patient outcomes. The Iowa Model of Evidence-Based Practice to Promote Quality Care (Titler et al., 2001) provided the framework to lead this change and ensure that the most current evidence is available in daily practice.

Radiation therapy uses high-energy waves to interrupt tumor growth, disrupt cellular processes including cell division, and ultimately cause cellular death, which triggers tumor shrinkage. The amount and type of radiation is dependent on each individual patient with cancer, tumor size and location, cancer stage, preexisting health, method of radiation delivery, and total dose (NCI, 2010). Types of radiation include internal and external. Internal radiation consists of brachytherapy or seed implants, in which radioactive material is implanted near or into the tumor. External radiation uses an external beam to deliver the radiation to the tumor or tumor bed, with daily treatment usually delivered five days per week for an extended period of four to seven weeks. External radiation causes many of the observed skin reactions because radiation therapy targets rapidly dividing tumor cells as well as healthy skin cells (NCI, 2010).

The skin is the largest organ of the body and serves as its first line of defense by regulating thermal processes, protecting underlying structures, and excreting waste. The three layers of the skin are the epidermis, dermis, and hypodermis (subcutaneous). The epidermis includes the outer cornified layer and the deeper basal layer and is continually renewed through the proliferation and maturation of skin cells that are completely replaced every four weeks (McQuestion, 2006). The dermis contains support structures such as blood vessels, glands, nerves, and hair follicles, whereas the subcutaneous layer contains the adipose and connective tissues (Noble-Adams, 1999) (see Figure 1). Basal cells in the epidermis are destroyed as a result of external beam radiation (McQuestion, 2006). This destruction disrupts normal cell production and weakens skin integrity, which delays epithelial migration for healing. Radiation-induced skin reactions can occur one to four weeks after initial treatment and persist for two to four weeks following completion of treatment. Those adverse effects can occur on areas of the body that are exposed to radiation, particularly where the outer skin is thin and smooth (McQuestion, 2006). The severity of skin reaction varies greatly among individuals, depending on

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